

**Appendixes for the  
Yahara Lakes Advisory Group  
Final Report**

**September 2002**

## **List of Appendixes**

1. Mission of the Yahara Lakes Advisory Group (YLAG)
2. Communication Guidelines & Process Overview
3. Specific Issues to be Addressed by Subject Area and Speakers
4. Meeting Agendas and Minutes
5. Presenter Handouts (in order of presentation) – Available only from Mindy Habecker, Dane County UW-Extension Natural Resources/Community Development Educator (608)224-3718
6. Public Forum Brochure
7. Action Planning Template & Committee Action Plans
8. Decision Making Process and Method for Recommendation Evaluation
9. Handouts Presented by Stakeholders

# **Appendix 1**

## **Mission of the Yahara Lakes Advisory Group (YLAG)**

## **Yahara Lakes Advisory Group Mission Statement**

- A. YLAG will evaluate the existing lake level operating orders for lakes Mendota, Monona, Waubesa, Kegonsa, and the Stoughton Millpond. YLAG will evaluate both individual changes to lakes and operation of the Yahara River Basin and its lakes as a system. Consideration will be given to the following:
- a 1. Flood reduction
  - a 2. Sanitary sewer infiltration
  - a 3. Shoreline erosion
  - a 4. Fish and wildlife in and around the system
  - a 5. Recreation
  - a 6. Impact of future development
  - a 7. Economic implications
  - a 8. Natural scenic beauty
  - a 9. Effects of lake level management on riparian owners of the Yahara River System
  - a10. Effects of lake level management on Yahara River eco-system
  - a11. Restoration of pre-diversion flows (Madison Met 1950s diversion) to the lake and/or river system
  - a12. Flexibility of the orders to deal with climate changes and the resulting unknown changes in rainfall and runoff
  - a13. Preservation of existing groundwater inflow and spring discharges to the Yahara River system
  - a14. Optimization of communication and education
- B. YLAG will also review and give equal consideration to the following:
- b 1. Potential to decrease stormwater inflow into the basin
  - b 2. Potential to infiltrate storm water
  - b 3. Potential to increase outflow
  - b 4. Potential to use real time web based information sites
  - b 5. Potential physical alterations to the drainage system to improve flood flows
  - b 6. Potential for water quality improvements within the system

# **Appendix 2**

## **Communication Guidelines and Process Overview**

# OVERVIEW OF FACILITATED PROCESS

## Elements

- Includes multiple stakeholders, interests, perspectives, solutions, options
- An agreed-upon process
- A series of facilitated meetings
- Outcomes yet undetermined

## Group's Authority

### Pros and Cons of Using a Facilitated Process

#### Pros of the Facilitated Process

- Several Interests have a stake in the solution
- More perspectives usually produce a better solution(s)
- Search for a solution that satisfies the largest number of interests
- Avoid costs associated with poor decisions

#### Cons of the Facilitated Process

- Requires time and energy from participants
- Working through some conflict may be uncomfortable

## Facilitator's Role

- Help you agree upon a process
- Help you get through the process, including staying focused and on task, manage process
- Setting the tone for discussion
- The Role of facilitator does **not** include:
  - involvement in discussion content
  - advocacy for an interest (or solution or recommendation)
  - taking meeting minutes and managing all logistical details

## Facilitation principles

- Genuine participation
- An inclusive process
- Information is a critical resource to be freely shared among all participants
- Learning is a key component of the process
  - about other interests
  - about technical issues
- All participants agree on the process for making decisions and recommendations
- Everyone is equally responsible for the process and what comes from it
- The environment is one of mutual respect

## Communication Guidelines

- One speaker at a time
- Stay on task
- Listen to learn, not to oppose or attack
- Everyone participates, no one dominates
- Disagree without being disagreeable
- Attack the problem, not the person
- Respect time limits

# **Appendix 3**

## **Specific Issues to be Addressed by Subject Area and Speakers**

# Yahara Lakes Advisory Group: Educational Issues Addressed

## Biological and Chemical Issues

**Presenters:** Kurt Welke, Fish Manager, Wisconsin DNR, (608)273-5946, [welkek@dnr.state.wi.us](mailto:welkek@dnr.state.wi.us)  
Susan Graham, Lakes Coordinator, Wisconsin DNR (608)275-3329, [grahas@dnr.state.wi.us](mailto:grahas@dnr.state.wi.us)  
Russ Hefty, Conservation Supervisor, Madison Parks Dept, (608)267-4918, [Rhefty@ci.madison.wi.us](mailto:Rhefty@ci.madison.wi.us)

### *Weed Issues*

- Can we cost effectively poison the weeds in lower Mud Lake?
- What are the advantages and disadvantages of chemical weed control in the lower Yahara lakes? Will they aid in water flow?
- Are there other means than weed harvesting that are viable options for removing the constricting weed flow from selected river segments? What are the causes and drawbacks?

### *Fishery Issues*

- What are the specific requirements for spring water levels for a successful fish spawn?
- What are the lake level elevations needed for maintaining high quality habitats for fish and other wildlife habitats so that they can optimize their use?
- What are the water level impacts on the fishery and wildlife?
- What are the specific habitat needs for fish and other wildlife? Where in the system are they most critical to maintain?
- What are the effects of the current water levels on fish spawning and migration?
- Do the fish spawning areas adapt to long-term water level changes in a wetland environment?
- Can the winter and summer minimum levels be lowered without adversely affecting fish habitat? If so how much lower? Can you do a sensitivity analysis on this?

### *Other Issues*

- What has been the environmental damage of recent floods to the wetlands, bogs, shorelines, and other areas?
- Where are there opportunities for restoring or reclaiming wetlands in the Yahara River watershed? How extensive are they?
- How many acres of drained wetlands have been lost? What is the lost flood storage in the basin?
- Is it cost effective to restore wetlands and also increase the upland storage to reduce flood peaks and duration?
- What are the positive and negative effects of reintroducing Madison Metropolitan Sewage District's effluent back into the lake/river system? How could it be made more acceptable?
- How can Madison Metropolitan Sewage District's effluent be reintroduced into the northern part of the Yahara system in a cost effective way?



## Water Dynamic and Modeling Issues

**Presenters:** Ken Potter, UW Civil and Environmental Engineering, (608)262-0040, [kwpotter@facstaff.wisc.edu](mailto:kwpotter@facstaff.wisc.edu)  
Bill Krug, US Geological Survey, Hydrologist, (608)821-3829, [wrkrug@usgs.gov](mailto:wrkrug@usgs.gov)

### *Flooding/Water Dynamics Issues*

- Can we develop a map or diagram of the entire lake system that indicates the constrictive point?
- With respect to water levels, at what point do incremental increases in maximum elevation correspond to what costs? i.e. if Mendota goes up 0.1 foot, what are the impacts and costs? Do the same for minimum within reasonable ranges.
- What would happen if we revised the lake levels one foot lower than the current levels?
- What changes in the frequency and duration of flooding events have occurred over the past 100 years?
- What have been the changes in flood levels with respect to various rainfall frequency and duration?
- What have the watershed changes been over time in terms of rainfall to runoff ratio?
- What is the impact of future and current development on lake flooding?
- What will another twenty to thirty years of development do to the inflow?
- What is the projected impact and magnitude of future development including impervious surfaces and increased runoff for the watershed?
- Structurally, where are the opportunities for affecting meaningful water level management and the potential cost?
- What is the relationship between lake levels and excess flows in sanitary sewers?
- What are the downstream abilities to handle significant increases in water flow?
- What is the cost of alternatives to divert flood water around the lake, such as pipelines, diversion channels etc.?
- Can we see historic flow and stage records for the Yahara River, especially in Lower Mud Lake?
- What are the data needs for managing the Yahara River Lakes and what would it cost for the Lakes and Watershed Commission to sponsor long term data collection efforts – both monitoring and models?
- What effects would dredging have?
- Can anything be done to improve the mechanical systems at existing dams and locks to increase the ability to pass water during high water periods?
- Why is the system regulated based on low flows and high flows when there have been no low flows in the last ten years?
- Discuss the flow monitoring done on the system?
- What are areas that are subject to flooding under different conditions – 1 foot over, 2 feet over, 3 feet over?

### *Model Issues*

- What is the percentage development at different levels - 10%, 20%, 30%, 40% in relation to the USGS model?
- What is the new USGS model going to do?
- What are the modeling options for this system?
- Can we simulate model runs that route floods through the systems with various changes in operating rules?

## **Infiltration and Stormwater Issues**

**Presenters:** **Kevin Connors, Dane County Land Conservation Dept,**  
**(608)224-3731, [connors.kevin@co.dane.wi.us](mailto:connors.kevin@co.dane.wi.us)**  
**Ken Potter, UW Civil and Environmental Engineering, (608)262-0040,**  
**[kwpotter@facstaff.wisc.edu](mailto:kwpotter@facstaff.wisc.edu)**  
**Roger Bannerman, Wisconsin DNR Environmental Specialist, (608)266-9278,**  
**[banner@dnr.state.wi.us](mailto:banner@dnr.state.wi.us)**  
**Brett Hulsey, Dane County Supervisor, (608)238-6070, [brett4us@aol.com](mailto:brett4us@aol.com)**

### *Stormwater Issues*

- Is there a need to accelerate and strengthen the Dane County stormwater ordinance implementation to reduce runoff? Do we need to focus more on large existing parking lots?
- What contaminants are coming in from the streams?
- How much does sediment contribute to the problem of flooding?
- Does the Yahara River sedimentation have an impact on high flow?
- What is the amount of water contributed to the system by natural flows, springs vs stormwater?
- Is there a need for more restrictive stormwater ordinances above the county's regulations in areas that contribute proportionally more stormwater?

### *Infiltration Issues*

- Can a serious analysis of infiltration practices be done? How practical is infiltration to solving the flooding problem?
- Can we gain enough storage/infiltration in the watershed to make a difference in lake levels?
- What engineering designs exist to increase infiltration of storm water on a large scale? Can wetland restoration in the watershed make a significant difference in storing water and keeping it out of the lakes?
- What opportunities are there in the existing developed areas for increasing infiltration and thus reducing stormwater runoff?
- Do rain gardens have any affect on reducing flooding?
- What are the benefits of additional stormwater controls such as infiltration?

## **Sewerage Issues**

**Presenter:** **Jon Schellpfeffer, Madison Metropolitan Sewerage District**  
**(608)222-1201 ext 266, [jons@madsewer.org](mailto:jons@madsewer.org)**

### *Sewerage Issues*

- What are the positive and negative effects of reintroducing Madison Metropolitan Sewage District's effluent back into the lake/river system? How could it be made more acceptable?
- What is the relationship between lake levels and excess flows in the sanitary sewers?
- How can Madison Metropolitan Sewage District's effluent be reintroduced into the northern part of the Yahara system in a cost effective way?

# Discharge Capacities of the Yahara Lakes Hydraulic Structures

**Presenters:** John Dunn, Sue Joseff, and Larry Nelson

## Social Issues

**Presenter:** Steve Born, Chair, UW Dept of Urban and Regional Planning, (608)262-9985, [smborn@facstaff.wisc.edu](mailto:smborn@facstaff.wisc.edu)

- Can we raise awareness of the lake flooding issue?
- Is it possible to increase the political will to address this issue?
- What kinds of methods and educational efforts can we use to inform the public of the need to spend money and take individual responsibility for stormwater?
- What is the possibility for developing the scenic beauty of the Yahara River system? What kinds of impacts would this be likely to have?

**Presenters:** Sergeant Dave Ritter, Dane County Sheriff's Dept, (608)284-6808, [ritter.dave@co.dane.wi.us](mailto:ritter.dave@co.dane.wi.us)  
Sue Jones, Dane County Lakes and Watershed Commission, (608)267-0118, [jones.susan@co.dane.wi.us](mailto:jones.susan@co.dane.wi.us)

- What will be the restraints and regulations on recreational boating and enforcement if lake levels change?
- How will controlling water flow affect navigation on the Yahara River and lakes, if it is raised or lowered? Will there be traffic in areas that have little or none now?

**Presenters:** Yahara Lakes Advisory Group Members

- What are the natural resource constraints for minimum and maximum lake level requirements for the various user groups? Where is there flexibility? Where are they mutually exclusive?

## Economic Issues

**Presenter:** Kevin Connors, Director of Dane County Land Conservation Department, (608) 224-3731, [Connors.Kevin@co.dane.wi.us](mailto:Connors.Kevin@co.dane.wi.us)

- What is the estimated cost of making meaningful physical improvements of the drainage constrictions in the system?
- What is the cost of increasing the flood flow capacity in the Yahara River?
- Where are the flood plain homes located? How many are routinely affected by high water? Can some of these be moved out of harm's way?
- What financial programs are or will be available for upland management practices? What are the eligible practices and their benefits?

**Presenter: Ray Potempa, Friends of Lake Kegonsa Society (FOLKS), (608)838-9329, [rijp3411@aol.com](mailto:rijp3411@aol.com)**

- Can an economic study be done to demonstrate to the county the benefits of the lake to the tax base from lake front property owners and others?

**Presenter: Richard Bishop, UW Dept of Agricultural and Applied Economics, (608)262-8966, [bishop@aae.wisc.edu](mailto:bishop@aae.wisc.edu)**

- What is the economic value of the Yahara Lakes to the local economy? How is this affected by water quality – either good or bad?

**Presenter: Dave Janda, Assistant Director of Dane County Emergency Management, (608)266-9051, [janda@co.dane.wi.us](mailto:janda@co.dane.wi.us)**

- What is the cost to buy out the most flood-prone property vs. the cost to dredge or change water levels?
- With climate change, do we need updated flood insurance maps of riparian areas?
- When FEMA maps are updated, what is the effect of current flood policy on riparian land value and insurance costs?

**Presenter: Mike Kakuska, Dane County Regional Planning Commission, (608)266-9111, [dcrpcadm@execpc.com](mailto:dcrpcadm@execpc.com)**

- What is the economic contribution made by anglers and others using the lake to the local economy?

**Presenter: Ken Johnson, Basin Supervisor, WI Dept Natural Resources, (608)275-3243, [johnsk@dnr.state.wi.us](mailto:johnsk@dnr.state.wi.us)**

- What are the potential funding mechanisms to support the Yahara Lake Advisory Group's recommendations?

**Presenter: Larry Nelson, City of Madison Engineer, (608)267-4227, [lnelson@ci.madison.wi.us](mailto:lnelson@ci.madison.wi.us)**

- What is the annual cost of flood damage over time? What are the trends?
- What are the economic issues of flooding on each individual lake?
- What are the costs both private and public of the major floods in the past decade, especially the floods of 1993, 1996, and 2000?
- What are effects of changes to the lake operation rules on riparian property owners, economically and recreationally?
- What is an appropriate social policy concerning flood events (what are the consequences and cost/benefits)?
- Will/can county and local governments design stormwater systems to prevent flooding?

# **Appendix 4**

## **Meeting Agendas and Minutes**

## Dane County Office

1 FEN OAK CT RM 138  
MADISON WI 53718-8812  
608/224-3718 MINDY HABECKER  
608/224-3727 FAX  
608/224-3703 TTY

## Cooperative Extension

<http://www.uwex.edu/ces/cty/dane>

### Yahara Lakes Advisory Group

#### **Meeting Agenda: October 16, 2001 (6:30 pm- 9:00 pm) Dane County Public Works Administration Building**

6:30 Kickoff – Introductory Remarks from DNR (Ken Johnson) and Dane County

6:45 Round Robin Introductions (3 min each, please). Name, affiliation, your personal and /or organizational interest in (or unmet needs regarding) Dane County lake water levels.

7:45 Review Draft Mission/Charge/Purpose

8:15 Ground rules for group process - Expectations of members - Group membership

8:35 Schedule and agenda for next meeting[s]

8:45 Public Participation [If any]

9:00 Adjourn - Exit Exercise: What would be a better name for this group?

**Next meeting is scheduled for: Monday, November 26, 2001 at 6:00 pm.**

#### **Directions to the Public Works Administration Building:**

This building is part of the Alliant Energy Expo Center Complex. Take Rimrock Road entrance to the Expo Center off the Beltline. Drive straight back to the last building on the left (it is a dark brick one story structure). If there is a paid parking event going on during this or any subsequent meeting we have scheduled there, tell the gate keepers that you are here for a government meeting at the Public Works Building. They will not charge you a parking fee.

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**Dane County Lakes Advisory Group  
Meeting Minutes October 16, 2001 6:30 pm  
Dane County Public Works Administration Building**

Ken Wiesner - DNR was the facilitator for this meeting.  
Mindy Habecker UW- extension will be the facilitator for future meetings

**Purpose of this meeting -**

1. Agree on a mission and purpose
2. Getting organized - time frame, etc.

**Introductions** – Meeting is cosponsored by DNR and Dane Co.

Ken Johnson - SCR - Lower Rock River Team Leader - introduced his staff that were in attendance to support the meeting - minutes, group recording, etc. Ken presented a historical view of the dam regulations and the dams on the Yahara River. Much of his presentation is in the agenda.

- The regulations protect public interest-  
Navigation, fish & wildlife habitat, natural scenic beauty
- Orders usually include a minimum and maximum allowable water level and a minimum outflow.
- Most recent water levels in 1979.
- Lake Mendota and Monona, and the Yahara River below Kegonsa listed on the 303D list of impaired waters.
- Lake Mendota listed as a priority watershed.
- Fish has flourished on Lake Mendota and Monona in the last 10 years..
- How are we dealing with flooding?

Ken introduced the proposed mission statement that would be discussed during the meeting.

Ken Kosciak – Dane County Public Works Director - Welcomed the group

- 1980 - City of Madison and Dane County agreed that Dane County should operate the dams.
- Dane County Public Works include Engineering, solid waste and , lakes
- 60 hours - gage reading and operating decisions
- 90 hours - operating
- 100 hours - public contact
- Annually 250 to 400 hours
- slides of the dams and explained the ability to operate each.
- introduced the Lake Mendota operating orders, gages, weedcutting and the multi-uses on the lakes. Passed out the level log for October to date.
- shared a couple of lake level stories concerning the types of complaints that he deals with on a regular basis.
- Ken explained that the control in the system is the channel below Waubesa. Passed out the rating curve.

Sue Jones - Dane County Watershed Commission staff - Kathleen Falk supports the mission as it exists - and reserves the right to withdraw sponsorship if it changes.

Ken Johnson passed out info. on dams.

**Introductions around the table**

What's your interest? What are your unmet needs? What's on your mind? Topics for future meetings?

Margaret Andersen

- Having flooding problems in Shorewood
- What to do with water w/o damaging lakes
- Enhance lake quality

- Learn
- Here to find out how jurisdictions can work together

Jan Zimmerman - Lake Waubesa Cons. Org.

- Her organization formed over a single issue/threat
- Conservation Fund Mgr.
- Get information on what's happening. Why?

Chuck Dykman - Yahara Lakes Association

- Sitting in for Bill Fitzpatrick
- Assoc. concerned about flooding - their #1 issue
- High Expectations
- Observation is that flooding takes a low priority in County Govt. (interest and funding)
- Agree w/position YAL newsletter to County Board
- Concerns - seeing increased watershed runoff
- Decreasing ability to remove water

Kurt Welke - Fish Mgr.

- Kids can/need to experience better water quality - like he used to
- Fisheries are very good in the lake
- Opportunities to optimize habitat are there - Upper and Lower Mud Lakes and Yahara River
- North side of lake is not what it used to be (productivity)
- Water levels are not what they can be, at times, for the fish to do their thing (esp. spring time)
- Optimize fisheries protect H2O Quality
- Statistical analysis of numbers/evaluate what it means

Jeff Nelson - Dane County Sheriff Office Nelson - Dane Co. Laks Patrol (Sheriff's Department)

- Consistent answer - why the lakes are at the level they are at
- Get lots of calls on lake levels
- "I'm not sure call Ken Koscik" - not good
- "It's easy for you to say you can get the lakes up . . . you don't live on the lake and pay the high taxes"
- "With an air conditioner and a furnace you can live in a home with a 100° + range. All I ask is you live within a 6" lake level range"

John Dunn - Public Works (Dane Co.)

- Conflicts between weed cutting and fishermen (keeping the flow open and killing fish)
- Answer for people - w/o passing the buck
- Reason he's here is the answer needs to be developed

Eileen Bruskevitz - Dane Co. Supervisor

- Has many constituents that are riparians . . . thus concerns
- Constituents want to know how to protect shorelines
- Sand from Gov. Nelson plugging 6 Mile Creek = worked with many people at table
- Concerned about private property rights - need to respect their rights
- Hoping that the process will help her constituents
- Have a tour (chaperone) so she can see it first hand

Larry Nelson - City of Madison Engr.

- High lake levels on Mendota/Monona
- Problems w/shorelines and sanitary and storm sewers
- As lakes go up - basement flooding increases
- Storm sewers less efficient w/high Lake levels
- 1996/2000 - Shoreline damage was high on public shores \$.5 million damage
- Want to raise shorelines about 1' (2' above regional flood)

Jon Schellpfeffer - Madison Metro Sewerage District

- Treat water and pump it around the lakes
- During low flows divert 40 million gallons out around and then rack in
- In low flow conditions would like to look at returning it back into lakes - (like 1988 drought). Doing that w/Verona's discharge and return flow back to Sugar River)



Mike Kakuska - Dane Co. Regional Planning Comm.

- Yahara Lakes model - Bill Krug USGS
- Links to USGS real time
- Purpose - develop operating (rules) models low flow conditions
- Basically the modeled showed that base flow could be increase without violate DNR water level orders more that the orders are currently violated.
- Limited capacity of system to relay flows problem
- Thankless job (Ken Kosciak's) - knows when its successful when praise = complaints
- Awarded Lake Planning Grant (tool to eval.) to evaluate the model (USGS) calibrate model for full range flooding and drought available March - 2002
- Evaluate alternatives for control or operation
- Understand physical constraints
- Weeds in the river influence the amt. of H2O in cubic feet per second you can "let out" (575 CFS vs. 295 CFS)

John Vandinter - Town of Westport Supervisor

- All he wants Ken Kosciak to do is anticipate the storms
- Has faith in the people around the table
- Lots of competing interests
- "I don't give a damn about the people in Belle Isle" is often heard in Westport
- Storm sewers are of great interest
  - Try and get a handle on lake levels (may not make the people happy)
  - Public Education - Esp. lake people - need to know what is being done
  - Slow done rate H2O is coming in . . . increase groundwater recharge

Aicaroo Roa - Dane Co.

Always wanted to live near water . . . now there's too much.

- Economic study will determine success of study
- 66% of Lake Mendota is owned by Public Institutions
- 1996 - Assessed valuation on lakes 1 billion
- 1996 - Linear foot \$4,000/ft. in Shorewood
- Public org. need to put more \$ into lakes
- Lake Use Mgmt. Plan (develop)

Jay Hoel - Town Of Dunn

- Seen lot of changes since 1960's
- Pressure is higher
- Sand bagging has been more frequent
- If weeds are holding back H2O what is contribution to this by non-point (causing weed problems)
- Big concern with dredging (not doing it) Kegonsa - Lower Mud (is it possible - w/archaeological concerns)

Ray Potempa -FOLKS President

- Had a water level issue problem - 700 signatures on a petition
- Have a model process ongoing which will look at it holistically
- Call them Yahara Lakes not Dane Co. Lakes - call it a system
- Maybe Mendota is too large . . . maybe we are doing best
- Look at other options - Education/Riprapping modifications
- Economic impacts based on looking at system
- Large investments in shorelines/equipment/property
- First priority - define what the system is
- Need to be mindful of what happens downstream

Brett Hulsey - Dane Co. Supervisor (Lakes and Watershed)

- Likes to water ski on Lake Kegonsa - when you fall down you can walk back
- Climate change (moving into a wet period)
- Lost 7500 acres of wetlands in L. Mendota's watershed perhaps pay farmers for storage
- Look at runoff from developments (new planned) Waunakee 6 Mile Creek

- Economics - Cost effective flood protection
- Put solutions on tables - buyouts
- Upland restorations
- Charge for developments - weed harvesting
- Do no harm flood plain policy - downstream folks are tired of our water
- With snow conditions and melting you can have problems dependent on how much snow you have and the nature of melt.

### **Proposed Mission**

Many of the concerns brought out around the table are beyond DNR authority but may be useful, necessary, etc. for others.

- The group likes a public education component
- Economics are important.
- Need to look at the future – 20 years or more
- Yahara River Lake System
- Need to identify the concerns before we define a mission statement.
- A series of missions with breakout groups on submissions
- Take on what we have authority or control over for
- Many would be satisfied if the water could be managed within the existing water level orders
- Need to look for institutional changes

Ken W. Suggests that three sponsors discuss and bring back to group which means the next meeting will be used to discuss mission. Or the three plus to recommend to the group - (Aicardo, Ray)

### **Group Ground rules**

Can wait because the mission isn't determine.

Ken Potter and Kevin Kesterson were unable to attend this meeting but will in the future

Are all interests represented? Ag interest      Fish interest      Marina Interest      Drainage Board  
    Developers      Regulators      Wildlife

Forward names to Ken Johnson – need to keep this a working group.

### **Meeting Schedule & agenda**

Next Meeting?      November 26, November 7 or 8

Ken Johnson was asked when does the department needed to make a recommendation. Ken thought that a recommendation by Spring would be wonderful.

Agenda ideas for the next meeting  
 The system - Ken Koscik and Sue Josheff  
 Bill Krug and his hydraulic models

#### **Other issues**

Physical constraints in the system  
 Options for increasing outflow  
 Competing interests list  
 Floodplain development & policy  
 Climate  
 Lake economics

#### **Options for decreasing inflow**

Dredging and archeological studies  
 Storm events – 100-year floods  
 Bibliography of educational information  
 Prediction and options for flood response  
 Why things are different today?

### **Public Participation**

Two individuals attended the meeting. Concerned about levels, erosion - appreciate the effort - thinks the

modeling and education is important. Let's make recommendations and make the politicians decide. Climatic change for long-term planning - wetland loss, water quality, improve wetlands.

**What should this group be called?**

Many felt that the Yahara River Lakes was more descriptive than Madison Lakes.



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Cooperative Extension

<http://www.uwex.edu/ces/cty/dane>

## **Yahara Lakes Advisory Group**

### **Yahara Lake Level Study Group**

#### **Meeting Agenda: November 26, 2001 Dane County Public Works Administration Building**

1. Introductions
2. Synopsis of Oct 16<sup>th</sup>, 2001 meeting and subsequent boat tour of lakes
3. Review draft mission statement for the group
4. Presentation by Sue Joseff, DNR Dam Safety Engineer on:  
Introduction to the Yahara Lakes System
5. Generation by group members of:  
Issue topics and learning needs of group to be able to make recommendations to address the group's mission
6. Next steps and setting future meeting dates
7. Public Comment

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**Dane County Lakes Advisory Group**  
**November 26, 2001 6:00 pm**  
**Dane County Public Works Administration Building**

Agenda:

1. Introductions
2. Synopsis of Oct. 16, 2001 meeting and boat tour of lakes
3. Review draft mission statement for the group
4. Presentation by Sue Josheff, DNR Dam Safety Engineer: Introduction to the Yahara Lakes System
5. Generation by group members of:
  - Issue topics and learning needs
  - Recommendations to address the group's mission
6. Next steps and setting future meeting dates
7. Public comment

**1. Introductions**

Advisory group members present: Ken Johnson, Ray Potempa, Brian Joiner, Carl Sinderbrand, John Van Dinter, Mike Kakuska, Ken Kosciak, Eileen Bruskwitz, Kurt Welke, Ken Potter, Jan Zimmermann, Sue Jones, Aicardo Roa, Dick Lathrop, Don Hammes, Jon Schellpfeffer, Dave Zugenbuehler, Brett Hulsey

Mindy Habecker, UW-Extension and Ken Wiesner, DNR were the facilitators for the meeting.

**2. Synopsis of October 16, 2001 meeting and boat tour of lakes**

**3. Review draft mission statement**

Suggestion on organization of the mission: group the two sections into group A – Impacts and group B – addressing impacts.

Other comments:

- Water level management refers to the river too. Address the management to the system. The existing water level orders do specify flows so maybe need to look at them and see if they need revision.
- More emphasis on information and education to the public.
- Address flexibility to incorporate trends (i.e. Climate).
- What about impacts to springs? This may be addressed in the stormwater management and infiltration points. Consensus to address this in an item discussing the system and low flow.
- Clarify that the item “potential to decrease inflow” is referring to stormwater and what the inflow is into.

**4. Presentation by Sue Josheff, DNR Dam Safety Engineer: Introduction to the Yahara Lakes System – Slide presentation. Below is the text from that presentation.**

## **Remember...**

- Water flows downhill
- Watershed = Basin = Drainage Area

### **Mendota Lock and Dam**

- Original Dam built in 1847 to operate a flour mill
- Dam reconstructed in 1866 after failure
- City purchased dam in 1896 - wooden dam replaced with concrete dam and lock
- Current dam rebuilt in 1959
- Dane Co. took over ownership in 1980
  - Two 12-foot tainter gates and a 20-foot wide by 110-foot

### **Kegonsa Dam**

- 1937 - permit to build dam - normal level 842.6
- 1938 - Dam built
- 1946 - Experimental operation 842.6(summer) w/ fall, winter spring levels
- 1948 - official change to 842.6 (summer)
- 1972 - Water level orders 843.1 max., 842.6 min.
- 1917 - problems with water levels
- 1932 - Stoughton prohibited from removing weeds

### **Stoughton Dam**

- Original Dam built in about 1911 by City of Stoughton
- Dam failed in 1915 - Reconstructed of concrete gated section in 1915-16
- Dam embankment failed in 1959 and repaired
- Additional repairs in 1973-74
- Consists of two 14-ft tainter gates, a 14-ft. stoplog section, and a 4 by 4-ft. sluice gate

### **Water Level Orders**

Mendota - 1-18-79

1. Max. = 850.1
2. Min. - first Spring runoff after March 1 to Oct. 30 = 849.6 Nov. 1 to first Spring runoff = 848.2
3. April 1 - May 15 - one tainter gate open 0.3 feet
4. During normal and low flows, hold 4.9 feet difference between Mendota and Monona
5. Hold as close as possible

## Water Level Orders

Monona and Waubesa - 1-18-79

1. Max = 845.2 (Monona) 845.0 (Waubesa)
2. Min - first Spring runoff after March 1 to Oct.30 = 844.7 (Monona), 844.5 (Waubesa)
3. Min - Nov. 1 to first Spring runoff 842.2 (Monona), 842.0 (Waubesa)
4. Min. discharge = 50 cfs at dam between April 1 and May 15. All other times 10 cfs.
5. Hold as close as possible

## Water Level Orders

Kegonsa - 4-11-79

1. Max = 843.5
2. Min - 843.0
3. Dane Co. to coordinate Mendota, Waubesa, Kegonsa and Stoughton Dams

## Water Level Orders

Stoughton - 12-23-83

1. Max = 842.0
2. Min - 841.0
3. Operate all gates to maintain water levels
4. Min. discharge - 15 cfs
5. Report dam operation promptly to downstream dam operator.
6. Keep a log
7. Secure gate to prevent manipulation
8. Structural deterioration

End of presentation

### **5. Generation by group members of issue topics and recommendations to address group's mission**

The advisory group spent time generating their top 3 topics and recommendations. The ideas generated were grouped under 4 headings: physical aspects and system hydraulics issues, biological and chemical aspects and issues, social and economic issues, other issues. The purpose of this exercise was to identify where the advisory group needs more information and generate a list that experts could come and provide this information. Mindy Habecker will send out a separate summary of these as well as a draft list of potential speakers to address the topics.

### **6. Next steps and future meeting dates.**

- The format for the next few meetings will tentatively be 2 presentations by different speakers (each a 1/2hr. presentation and 1/2hr. for questions).
- It was decided that the next few meetings would alternate between a daytime meeting and evening meeting to try to accommodate all advisory members schedules.
- Schedule is as follows:

**December 17, 2001 11:00 AM – 1:00 PM**

**January 14, 2002 6:30 PM – 8:30 PM**

**February 14, 2002 11:00 AM – 1:00 PM**

Meetings will take place in the Public Works Administration Building in the Alliant Energy Expo Center Complex.



Dane County Office

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## Yahara Lakes Advisory Group

### Meeting Agenda: December 17, 2001 (11:00 am- 1:00 pm) Dane County Public Works Administration Building

1. Review draft mission statement for the group.
2. Discuss communication guidelines and assumptions for the facilitated process.
3. Review grouped issues and potential future presenters.
4. Presentation and discussion of biological and chemical issues of the Yahara Lakes

### Biological and Chemical Issues

**Presenters:** Kurt Welke, Fish Manager, Wisconsin DNR, (608)273-5946, [welkek@dnr.state.wi.us](mailto:welkek@dnr.state.wi.us)  
Susan Graham, Lakes Coordinator, Wisconsin DNR (608)275-3329, [grahas@dnr.state.wi.us](mailto:grahas@dnr.state.wi.us)  
Russ Hefty, Conservation Supervisor, Madison Parks Dept, (608)267-4918, [Rhefty@ci.madison.wi.us](mailto:Rhefty@ci.madison.wi.us)

#### *Weed Issues*

- Can we cost effectively poison the weeds in lower Mud Lake?
- What are the advantages and disadvantages of chemical weed control in the lower Yahara lakes? Will they aid in water flow?
- Are there other means than weed harvesting that are viable options for removing the constricting weed flow from selected river segments? What are the cause and drawbacks?

#### *Fishery Issues*

- What are the specific requirements for spring water levels for a successful fish spawn?
- What are the lake level elevations needed for maintaining high quality habitats for fish and other wildlife habitats so that they can optimize their use?
- What are the water level impacts on the fishery and wildlife?
- What are the specific habitat needs for fish and other wildlife? Where in the system are they most critical to maintain?
- What are the effects of the current water levels on fish spawning and migration?
- Do the fish spawning areas adapt to long-term water level changes in a wetland environment?
- Can the winter and summer minimum levels be lowered without adversely affecting fish habitat? If so how much lower? Can you do a sensitivity analysis on this?

#### *Other Issues*

- What has been the environmental damage of recent floods to the wetlands, bogs, shorelines, and other areas?



- Where are there opportunities for restoring or reclaiming wetlands in the Yahara River watershed? How extensive are they?
  - How many acres of drained wetlands have been lost? What is the lost flood storage in the basin?
  - Is it cost effective to restore wetlands and also increase the upland storage to reduce flood peaks and duration?
  - What are the positive and negative effects of reintroducing Madison Metropolitan Sewage District's effluent back into the lake/river system? How could it be made more acceptable?
  - How can Madison Metropolitan Sewage District's effluent be reintroduced into the northern part of the Yahara system in a cost effective way?
5. Next steps and future meeting dates.
  6. Public Comment.

### **Directions to the Public Works Administration Building:**

This building is part of the Alliant Energy Expo Center Complex. Take Rimrock Road entrance to the Expo Center off the Beltline. Drive straight back to the last building on the left (it is a dark brick one story structure). If there is a paid parking event going on during this or any subsequent meeting we have scheduled there, tell the gate keepers that you are here for a government meeting at the Public Works Building. They will not charge you a parking fee.

**Yahara Lakes Advisory Group**  
**Meeting Minutes December 17, 2001 11:00am**  
**Dane County Public Works Administration Building**

Members present: Ken Johnson, John Van Dinter, Dave Zugenbuehler, Bill Fitzpatrick, Kurt Welke, Ray Potempa, Don Peterson, Jan Zimmermann, Don Hammes, Gary Weinert, Sue Jones, Dick Lathrop, Mike Pinnow, John Dunn, Ken Potter, Jon Schellpfeffer, Mike Kakuska, Rick Gullickson, Eileen Bruskevitz, David Taylor, Carl Sinderbrand, Larry Nelson, Aicardo Roa, Brett Hulsey. Facilitator: Mindy Habecker

1. Modifications to mission statement: See Attachment A.
  - Redundancy in a4 and a10, can they be lumped?
  - Integrate priority watershed finds as they pertain to lake levels
2. Overview and discussion of the facilitated process. Mindy Habecker handed out an overview of the facilitated process. See Attachment B.

The handout included the pros and cons of a facilitated process, facilitator's role, facilitation principles, communication guidelines, and the group's authority. Mindy emphasized a few points: 1)that the process is an inclusive process and if an advisory group member feels he/she is not being heard, talk to Mindy. 2) If a member will miss a meeting, make sure to read the minutes to stay abreast of the process. 3) If a member will miss more that one meeting they might want to get an alternate representative to help fill in.

Discussion of the group's authority took place. The role of the advisory group is to put forward recommendations primarily to the Department of Natural Resources for any water level order changes. Secondly, the advisory group will also put forward any recommendations to the County and other municipalities.

A binder will be started that includes all the information collected over the course of this process. Mindy Habecker also discussed the possibility that she would draft a report including an executive summary and an appendix of information at the end of the facilitated process.

The question was asked as to whether the advisory group would break into subgroups to tackle issues. This is not planned right now, but may come up as the process unfolds.

The advisory group agreed to follow these guidelines.

3. If you missed the November 26, 2001 meeting, please review the issues list. At the last meeting advisory members had a chance to list issues to be addressed by speakers to help formulate recommendations. If there is something you would like addressed, please pass it on the Mindy Habecker soon.
4. A list of advisory group stakeholder members was passed out. See attachment C. If a group member is missing, let Ken Johnson know.
5. Mindy sent out an email on December 12, 2001 with a draft of Issues to be addressed in the coming months and speakers that could do it.

Suggestions for speakers or changes in speakers listed included: Stream hydraulics: Ken Kosciak, scratch Dick Lathrop, possibly scratch Jonathan Foley (Ken Potter will look into whether Jonathan has any climate information relevant at the small scale we are working with), Jim Krohelski – USGS; Social Issues: Van de Wahl and Associates (doing work on development of the north shore of Lake Mendota for the County), Ken LePine from Dane County Parks, Steve Born – UW, Richard Bishop – UW, Maria Powell – UW

Look over the list and get any other potential speakers and contact information to Mindy Habecker soon.

6. Upcoming Meeting information  
January 14, 2002 (Monday) 6:30pm-8:30 pm, Dane Co. Expo building  
February 4, 2002 (Monday) 11:00 am-1:00pm, Dane Co. Expo building

Expect in January to set more meeting dates. The goal is to finish this process by Spring, 2002.

7. 3 presentations:
  - Aquatic plant issues – Susan Graham, Lake Specialist – DNR
  - Fisheries issues – Kurt Welke, Fishery Biologist – DNR
  - Wetland issues – Russ Hefty, Conservancy Lands Supervisor – City of Madison

**Aquatic plant issues – Susan Graham** (copy of Sue's handout is below):

#### CONSIDERATIONS FOR CHEMICAL APPLICATION TO YAHARA RIVER

I can't give a decision until management and technical staff review any permit application based on these issues:

**Permit must not violate state or federal laws.** FIFRA (Federal Insecticide, Fungicide and Rodenticide Act) is overseen by EPA, and it regulates pesticide registration and use. DATCP administers Chapter ATCP 29, Wis. Adm. Code (Pesticide Use and Control) and oversees state registration and use of chemicals, application licensing and certification. DNR regulates pesticide and other chemical use in or on state waters under NR 107, Aquatic Plant Management. We supply technical assistance, and review permit requests for chemical treatment. The permit procedure is to ensure that no damage inadvertently occurs to fish, wildlife, or beneficial native plant life in or near the treatment area.

- In reviewing permit applications, DNR biologists consider potential human and environmental hazards, whether the proposed treatment will provide nuisance relief, and whether the treatment would place unreasonable restrictions on existing water uses.
- DNR may deny a permit if it determines the treatment will be ineffective, will result in unreasonable use restrictions on current water uses, or will produce unnecessary adverse side effects on nontarget organisms.
- Our previous experience with treatments in flowing water have been ineffective (Badfish Creek for effluent conveyance), and ineffective treatments are prohibited in NR 107.
- Unlike a typical lake application where treatments are isolated along relatively small littoral areas, a river treatment will expose the entire channel to chemical(s) and the potential for negative impacts are greater. Decomposing aquatic vegetation in a long channel stretch could create a significant BOD (biological oxygen demand) and dissolved oxygen depletion. Any potential chemical treatment that results in a direct or indirect fish kill will be denied.
- If effective, a chemical treatment will have only short-term relief and repeated treatments will be needed, increasing the potential for negative impacts discussed above.
- Other options for control must have been ruled out (see permit application form 3200-4). What other options for flood control and relief have been evaluated? Perhaps offering a more direct and long-term benefit?

Any scenarios I can imagine are not encouraging. Consider the most obvious scenario. The plant that grows in abundance in the Yahara River is Vallisneria, also called wild celery, eelgrass or tapegrass. The chemical registered for use in Wisconsin that will kill Vallisneria, is Hydrothol 191, the amine form of endothol. The label states that "the minimum contact time with plants for optimum results should be two hours". This contact would be difficult if not impossible to achieve in a flowing water situation such as a river. Hydrothol 191 is toxic to fish at dosages well below the concentration required to effectively kill plants. Use of this chemical,

therefore, would be in violation of the laws cited above it would be ineffective, and it would cause adverse side effects on fish, which are a non-target organism.

Contact information:

Susan Graham  
608-275-3329  
grahas@dnr.state.wi.us

Comments:

Wild celery is the predominant aquatic plant growing in the area of the Yahara River. This plant is considered a high quality aquatic plant for waterfowl and fish and is not a plant you would want to completely remove.

Remember that the Yahara River is a federally listed impaired water.

Weed cutting to keep the channel open is critical. However, the County states that the area where the wild celery needs to be cut is shallow and rocky so it is hard on their equipment. In addition, in the summer it is hard to keep up with the cutting.

**Fishery Issues – Kurt Welke** (copy of Kurt’s handouts in handout section):

Comments:

Muskies were left out of the talk – they don’t naturally reproduce in the Yahara Lakes in any significant numbers.

Carp were also left out of the talk (concentrated on game fish) although carp play a large role in the dynamics of the Yahara Lakes.

Comment about northern pike – don’t want to strand the fish in the spawning and nursery marshes by draining the lakes down too fast.

Fishing in the Madison area is big business – For example, the year 2000 was an excellent perch year. Fisherman can harvest 200,000 to 300,000 perch in a season in a good year. At \$2.00/fish (if you go by fish market prices to buy a perch) that can add up.

Need to know how low the water levels in the system can go and not significantly affect spawning.

**Wetland Issues – Russ Hefty**

Summary of handout (taken from the Lake Mendota Priority Watershed Plan, p. 2-44):

Wetland area of the Yahara Lakes between 1835 and 1974 and percentage lost

Year	Mendota	% lost	Monona	% lost	Waubesa	% lost	Kegonsa	% lost
1835	10,176		4,891		6,200		5,829	
1938	7,879	23	1,828	63	4,792	23	4,248	27
1974	5,088	50	371	92	1,680	73	1,754	70
<b>Total lost</b>	<b>5,088</b>		<b>4,520</b>		<b>4,520</b>		<b>4,075</b>	

Total lost flood storage is 18-90,000 acre-feet of water, 5.4-27 billion gallons.

Comments from Russ:

Lost 200 feet of wetland from 1968 to 2000 around the Yahara River upstream of Hwy 113. Example, due to high water levels in 1993 a large piece of bog from that area broke off and was lost in 1993.

Radical possibility: to recreate wetlands let's lower Lake Mendota.

Possibility exists to use bioengineering to stabilize wetlands. However, more stable water levels are needed to do this.



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## Yahara Lakes Advisory Group

### Meeting Agenda: January 14, 2002 (6:30- 9:00 pm) Dane County Public Works Administration Building

1. Review draft mission statement for the group
2. Review communication guidelines
3. Discuss potential future presenters
4. Presentation and discussion of water dynamic and modeling issues of the Yahara Lakes

#### Water Dynamic and Modeling Issues

**Presenters:** Ken Potter, UW Civil and Environmental Engineering, (608)262-0040, [kwpotter@facstaff.wisc.edu](mailto:kwpotter@facstaff.wisc.edu)  
Bill Krug, US Geological Survey, Hydrologist, (608)821-3829, [wrkrug@usgs.gov](mailto:wrkrug@usgs.gov)  
Jeff Steuer, US Geological Survey, Hydrologist, (608)821-3830, [jsteuer@usgs.gov](mailto:jsteuer@usgs.gov)

#### *Flooding/Water Dynamics Issues*

- Can we develop a map or diagram of the entire lake system that indicates the constrictive point?
- With respect to water levels, at what point do incremental increases in maximum elevation correspond to what costs? i.e. if Mendota goes up 0.1 foot, what are the impacts and costs? Do the same for minimum within reasonable ranges.
- What would happen if we revised the lake levels one foot lower than the current levels?
- What changes in the frequency and duration of flooding events have occurred over the past 100 years?
- What have been the changes in flood levels with respect to various rainfall frequency and duration?
- What have the watershed changes been over time in terms of rainfall to runoff ratio?
- What is the impact of future and current development on lake flooding?
- What will another twenty to thirty years of development do to the inflow?
- What is the projected impact and magnitude of future development including impervious surfaces and increased runoff for the watershed?
- Structurally, where are the opportunities for affecting meaningful water level management and the potential cost?
- What is the relationship between lake levels and excess flows in sanitary sewers?
- What are the downstream abilities to handle significant increases in water flow?
- What is the cost of alternatives to divert flood water around the lake, such as pipelines, diversion channels etc.?
- Can we see historic flow and stage records for the Yahara River, especially in Lower Mud Lake?
- What are the data needs for managing the Yahara River Lakes and what would it cost for the Lakes and Watershed Commission to sponsor long term data collection efforts – both monitoring and models?
- What effects would dredging have?

- Can anything be done to improve the mechanical systems at existing dams and locks to increase the ability to pass water during high water periods?
- Why is the system regulated based on low flows and high flows when there have been no low flows in the last ten years?
- Discuss the flow monitoring done on the system?
- What are areas that are subject to flooding under different conditions – 1 foot over, 2 feet over, 3 feet over?

#### *Model Issues*

- What is the percentage development at different levels - 10%, 20%, 30%, 40% in relation to the USGS model?
  - What is the new USGS model going to do?
  - What are the modeling options for this system ?
  - Can we simulate model runs that route floods through the systems with various changes in operating rules?
5. Next steps and future meeting dates
  6. Public comment

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**Yahara Lakes Advisory Group**  
**Meeting Minutes January 14, 2002 6:30 pm** (revised 2/4/02 – see ~~strike-outs~~ and *italics*)  
**Dane Co. Public Works Administration Building**

**Advisory Group Attendees:** Dave Ritter, John Dunn, Sue Jones, John Van Dinter, Ken Potter, Ray Potempa, Jan Zimmermann, Bill Fitzgerald, Kurt Welke, Eileen Bruskevitz, Margaret Andreasen, Jon Schellpfeffer, Dave Taylor, Mike Kakuska, Rick Gullickson, Brett Hulsey, Don Hammes, Carl Sinderbrand and Mindy Habecker – facilitator.

1. Review draft mission statement for the group.  
Postponed to next meeting.
2. Review communication guidelines.  
One speaker at a time  
Stay on task  
Listen to learn, not to oppose  
Everyone participates, no one dominates  
Disagree without being disagreeable  
Attack the problem, not the person  
Respect time limits
3. Discussion of potential future presenters.  
The groups identified possible presenters for the social issues. They include Ken LePine, Steve Born, Sharon Chamberlain of Chamberlain Research, Maria Powell, Bill Provenger.
4. Presentation and discussion of water dynamic and modeling issues of the Yahara Lakes.

Ken Potter, professor in the UW College of Civil and Environmental Engineering presented:

LAKE MENDOTA FLOOD LEVELS AND WATERSHED DEVELOPMENT  
K.W. Potter  
1/14/02

#### SUMMARY

- Lake Mendota levels have increased over time.
- Analysis of precipitation and lake response indicates that this increase is due at least in part to development in the watershed.
- USGS modeling of Pheasant Branch indicates that if low-density residential development occurs in the undeveloped portion of the Mendota watershed, runoff amounts from medium to large storms will increase by about 20%. More aggressive development would increase runoff by greater amounts.
- Water balance analysis of Lake Mendota indicates that a 20% increase in the runoff occurring in 1993 would have increased the peak level of Lake Mendota by over 1.5 feet, assuming releases to Lake Mendota remained unchanged. A 50% increase in runoff would have increased the peak level by over 4 feet.
- Conventional stormwater management will not mitigate the impact of future watershed development on lake levels.



- Exploration of various alternatives for preventing catastrophic increases in Lake Mendota levels requires a much improved modeling capability, including a continuous rainfall-runoff model of the Yahara Lakes watershed and a sophisticated hydraulic model of the connecting channels.

His six page handout will be available at the next meeting for those that didn't get a copy.  
Page 1 is the summary above.

Page 2 is a graph of the Maximum Annual Levels for Lakes Mendota and Monona. There is a significant upward trend for the levels for Lake Mendota but not for Lake Monona. Professor Potter concluded that this is because Lake Mendota is managed to protect Lake Monona.

Page 3 is a graph of Response of Lake Mendota to a 6-inch Rainfall. That figure shows the significant increase in lake level 'bounce' from a 6-inch rate in 1995 compared to previous decades.

Page 4 is a graph of Maximum Annual Daily Flows for the Yahara River at McFarland. No trend can be seen.

Page 5 shows the results of a USGS study (Water Resources Investigation Report 01-4113) on Pheasant Branch. The study consisted of modeling the watershed for the existing condition development which is described as 6.8% connected imperviousness as well as the development scenarios A (16.8%) and scenario B (60%). The study results show that scenario A resulted in a 20% higher runoff rate and scenario B resulted in a 140% higher runoff rate.

Page 6 is a graph of Lake Mendota – 1993 levels from March 1 to Aug 1 for Actual and Modeled Levels. The graph compares the experienced 1993 water levels with what the water levels would have been if the inflow was increased by 20% and 50%. The Pheasant Branch study shows us that a 20% increase in inflow to Lake Mendota is very likely and that 50% is not unreasonable. Comments about the North Beltline and other development stimuli or concerns were mentioned. Many felt that we can't wait – the modeling must start right now.

The discussion following the presentation included asking how much the modeling needed to predict the results and study the alternatives would cost. Peter Hughes of USGS estimated \$200,000 and two years of work to complete a detailed rainfall runoff model. Model needs to cover from the headwaters to downstream of Stoughton Dam. Peter noted that Dane County's GIS will be of great benefit.

The Tenney Park Dam at the outlet of Lake Mendota outlet is not the problem. The dam has the capacity to release water. The problem is getting the water out of the lower lakes because of the lack of slope or head.

Professor Potter pointed out that new development's detention ponds won't solve the flooding problem because they are designed to discharge in a day or two. Since the Lakes take much longer to drain, the water is out of the detention ponds before the lakes drain. Infiltration would help and will be discussed at the next meeting.

Bill Krug, a hydrologist from the US Geological Survey presented a series of sophisticated graphs to discuss the relationship of rainfall to runoff at the McFarland gage.

#### First Data Set

Page 1 is a graph of annual rainfall at Madison verses runoff measures at the gage at McFarland.

Page 2 is a statistical analysis to represent the trend of Yahara River runoff over the years of 1931 to 2001. There was no statistical significance to the resulting trend line so the conclusion could not be made that for the same amount of rainfall, that we are experiencing greater runoff.

Page 3 is, again, a graph of annual rainfall at Madison verses runoff measures at the gage at McFarland but this time the MMSD diverted water is added into the runoff. The MMSD diverted water is the groundwater that is pumped for our daily use then treated by MMSD and discharged into the Badfish River which eventually empties into the Yahara River south of the Dane County boundary.

Page 4 is, again, a statistical analysis to represent the trend of runoff including the MMSD diverted water over the years of 1931 to 2001. The resulting trend line shows an upward trend of runoff over the years for the same amount of rainfall. Bill Krug pointed out that MMSD diverted water starts out as groundwater if not pumped may have remained groundwater, may have support more wetlands or lake levels that might have increased evaporation, etc. He also pointed out the prior to 1959, MMSD discharged the treated water into the Yahara so it supplemented the flows which is particularly helpful to sustain the low flows in the summer.

### Second Data Set

Page 1 is a graph of the discharge at the McFarland gage verses the average of the annual flows of three similar rivers with gage information. The three rivers are the Crawfish River at Milford, The Sugar River at Brodhead and the Fox River at Berlin.

Page 2 is a statistical analysis to represent the trend of Yahara River runoff over the years of 1931 to 2001. There is a slight downward trend of runoff amount ~~for the same rainfall~~ **relative to runoff at adjacent basins** over the 70 years.

Page 3 is again a graph of the discharge at the McFarland gage including the MMSD diverted water verses the average of the annual flows of three similar rivers with gage information.

Page 4 is, again, a statistical analysis to represent the trend of runoff including the MMSD diverted water over the years of 1931 to 2001. The resulting trend line shows an upward trend of runoff over the years ~~for the same amount of rainfall~~ **compared to adjacent basins**. This may be thought of as the total basin water trend but also similar concerns as the first data set.

Bill Krug and Ken Potter attempted to answer the questions listed in the agenda.

### **Flooding/Water Dynamics**

- Most constrictive points are probably the channel downstream of Lake Waubesa to Lake Kegonsa, which is effected by the levels held by the Kegonsa Dam and the outflow from Lake Kegonsa because the Stoughton Dam keeps water up to limit outflow from Kegonsa. ***This is based on regulatory pool levels, not dam capacity.***

The channel between the Kegonsa Dam and the Stoughton Dam is also a factor for limiting outflow from Lake Kegonsa. The Stoughton Dam can be opened to pass expected flow, so at high flows it is the channel, rather than the dam that is the limiting factor (assuming the dam is opened).

- The presenters didn't feel qualified to answer questions concerning cost.
- Bill Krug state that starting water levels one foot lower would result in lower peaks but generally starting one foot lower will results in something less than a 1 foot lower at the peak. To answer this question better, he would need to develop a model.
- Ken Potter's presentation discussed lake levels over about 85 years.
- Ken Potter and Bill Krug's presentations show higher percentage of rain running off the land.
- Both presentations indicate greater runoff for the same rain event.

- Future development will cause additional flooding around the lakes.
- Same as above.
- Ken Potter's presentation showed the impact of future development on Lake Mendota.
- Bill Krug didn't think more dams or modifications to the dams were necessary but some dredging may help. He thought a model would be needed to justify any structural changes.
- Next meeting's presentation by MMSD will cover the sanitary sewer problems.
- A model would show how downstream areas would handle increased flow.
- Bill Krug didn't address cost issues.
- There aren't significant level differences between Lower Mud Lake and Lake Kegonsa. The records for Kegonsa are not as complete as for Lakes Mendota, Monona and Waubesa.
- Data needs would include a gage to monitor outflow from Lake Mendota, an acoustic gage to better monitor flows out of Lake Waubesa Dam, survey for the channel between Lake Waubesa and Kegonsa and between Lake Kegonsa and Stoughton Dam. The cost of the Modeling would be \$200,000 or more depending on the questions the model is to answer. The cost of a gage can be \$10 - \$20,000 for installation and \$10,000 to \$15,000 per year for maintenance and data management.
- Bill didn't know what effect dredging would have without a model.
- Each dam's ability to pass flow doesn't appear to be the problem. It appears that the problem is that Stoughton Dam *operated in its regulatory range* backs up water and *appears to* limits the outflow from Kegonsa Dam. *If Stoughton Dam was able to operate outside its legal range, the dam gates would be opened, the reservoir could be drawn down and the Lake Kegonsa Dam could have a greater outflow capacity to pass floodflows and to lower Lake Kegonsa. Similarly, Lake Kegonsa Dam backs up water and appears to* limits the outflow from Lake Waubesa Dam. *If Kegonsa Dam was able to operate outside its legal range, the dam gates would be opened, the reservoir could be drawn down and the Lake Waubesa Dam could have a greater outflow capacity to pass floodflows and lower Lakes Waubesa and Monona.*
- The dams are operated to try to balance a variety of user and environmental needs under many conditions.
- Current monitoring stations –
  - Yahara River at Windsor – flow, phosphorus, sediment
  - Yahara River at Hwy 113 – flow, phosphorus, sediment
  - Spring Harbor – flow, sediment
  - Pheasant Branch at Hwy 12 – flow, phosphorus, sediment
  - Lake Mendota - stage
  - Lake Monona - stage
  - Lake Waubesa - stage
  - Yahara River at Hwy 51 flow (need increased precision)
  - Lake Kegonsa – level
  - Yahara River at Fulton (Rock Co.) - flow
  - Badfish Creek near Cooksville – flow (which includes MMSD diversion flow – In 2000, almost ½ of the flow at this gage was from MMSD)
- The group discussed the need to know the areas that are flooded at a given water level and the damages and

costs at those levels. This information is important for the group's recommendations. Kevin Connors stated that the County's new topographic information should be available soon (but not by March) and it will allow the County to delineate the flooded areas. It was pointed out that there are not good repetitive flood loss information or lake stage/damage relationships. Ken Potter pointed out the DuPage County, IL has spend hundreds of millions of dollars, mapping the floodplain, survey the structures, developing the damage relationships and purchasing structures in the floodplain. They have these tools but the social issues often don't allow for the economic solutions.

### **Modeling issues**

Bill Krug discussed the models that he's developed. The low flow model looked at options to increase the base flow downstream. This can be accomplished by holding water in Mendota and limiting the outflow to allow the stored water to supplement the natural low flow. Bill is developing the high flow model to see if you can get rid of water quicker but this may cause problems during droughts. His current models cannot adequately model the outflow from Lake Waubesa to determine if dredging or other dam operation would benefit the system.

Ken Steuer of US Geological Survey was shown on the agenda but did not present.

### 5. Next steps and future meeting dates.

Feb. 4, 11:00 am to 1:30 pm at Dane Co. Public Works Administration Building

Feb. 25, 6:30 pm – 9:00 pm at Dane Co. Public Works Administration Building

March 18, 11:00 am to 1:30 pm at Dane Co. Public Works Administration Building

Feb. 4 meeting's presenters are Kevin Connors, Ken Potter and Brett Hulsey. They will discuss development impacts on infiltration and stormwater.

The February 25 meeting will have presenters on the social issues and sewerage issues. The Madison Metropolitan Sewage District (MMSD) and sewerage issues will be addressed by John Schellpfeffer. If time permits, the group will discuss the process to be used to make the advisory group's recommendations.

The March 18 meeting will have presentations on fiscal and economic issues. Ray Potempa and Aicardo Roa will have their economics presentation ready for that meeting. The group will start formulating their recommendations at that meeting.

### 6. Public Comment.

Seven members of the public attended and there were no comments.

### 7. Other conversation

A request for a map of the gage locations and a summary of information being gathered was requested. Kevin Connors and John Dunn will assemble the information for the next meeting.

A map to the system's constrictions was requested. It was felt that this couldn't be done without more data.

Bill Fitzpatrick was asked if he could summarize the technical information that he heard at this meeting and put it into context of a lake property owner. Bill summarized that the Yahara Lakes system has some data needs and that additional gages for flow monitoring would help in the development of a water management model for the watershed. A water management model, including rainfall-runoff modeling, is necessary to identify the sources of current flooding problems such as constrictions in the lake system and the effects of future changes in the lake and watershed that may hurt lake property owners.

The group was asked if there was anything that could be done quickly instead of waiting for the modeling that would take at least two years. There was some discussion on changing water level orders

to require the lower dams to drop their water levels below their minimums to increase the outflow from the dams at Lakes Waubesa and Kegonsa.



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## Yahara Lakes Advisory Group

### Meeting Agenda: February 4, 2002 (11:00 am-1:30 pm) Dane County Public Works Administration Building

1. Review draft mission statement for the group.
2. Review communication guidelines.
3. Discuss potential future presenters.
4. Presentation and discussion of infiltration and stormwater issues of the Yahara Lakes

### Infiltration and Stormwater Issues

**Presenters:** Kevin Connors, Dane County Land Conservation Dept, (608)224-3731, [connors.kevin@co.dane.wi.us](mailto:connors.kevin@co.dane.wi.us)  
Ken Potter, UW Civil and Environmental Engineering, (608)262-0040, [kwpotter@facstaff.wisc.edu](mailto:kwpotter@facstaff.wisc.edu)  
Roger Bannerman, Wisconsin DNR Environmental Specialist, (608)266-9278, [banner@dnr.state.wi.us](mailto:banner@dnr.state.wi.us)  
Brett Hulsey, Dane County Supervisor, (608)238-6070, [brett4us@aol.com](mailto:brett4us@aol.com)

#### *Stormwater Issues*

- Is there a need to accelerate and strengthen the Dane County stormwater ordinance implementation to reduce runoff? Do we need to focus more on large existing parking lots?
- What contaminants are coming in from the streams?
- How much does sediment contribute to the problem of flooding?
- Does the Yahara River sedimentation have an impact on high flow?
- What is the amount of water contributed to the system by natural flows, springs vs stormwater?
- Is there a need for more restrictive stormwater ordinances above the county's regulations in areas that contribute proportionally more stormwater?

#### *Infiltration Issues*

- Can a serious analysis of infiltration practices be done? How practical is infiltration to solving the flooding problem?
- Can we gain enough storage/infiltration in the watershed to make a difference in lake levels?

- What engineering designs exist to increase infiltration of storm water on a large scale? Can wetland restoration in the watershed make a significant difference in storing water and keeping it out of the lakes?
  - What opportunities are there in the existing developed areas for increasing infiltration and thus reducing stormwater runoff?
  - Do rain gardens have any affect on reducing flooding?
  - What are the benefits of additional stormwater controls such as infiltration?
5. Next steps and future meeting dates.
  6. Public Comment.

### **Directions to the Public Works Administration Building:**

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**Yahara Lakes Advisory Group**  
**Meeting Minutes February 4, 2002 11:00 a.m.**  
**Dane Co. Public Works Administration Building**

**Advisory Group Attendees:** Dave Ritter, John Dunn, Sue Jones, Ken Potter, Ray Potempa, Jan Zimmermann, Bill Fitzgerald, Ned Paschke, Larry Nelson, Mike Pinnow, Ken Johnson, Mike Kakuska, Rick Gullickson, Brett Hulsey, Don Hammes, Carl Sinderbrand and Mindy Habecker – facilitator.

**1. Review draft mission statement for the group.**

Ken Johnson has incorporated proposed changes to the mission statement. The group needs to consider the distinction between the primary and the secondary mission when recommending additional changes to the statement. Ken Johnson will continue to accept changes to the statement. This will remain a continuing agenda item until a statement is confirmed.

**2. Review communication guidelines.**

One speaker at a time  
Stay on task  
Listen to learn, not to oppose  
Everyone participates, no one dominates  
Disagree without being disagreeable  
Attack the problem, not the person  
Respect time limits

**3. Discussion of potential future presenters.**

Brett Hulsey recommended Don Hay as a potential presenter for a future meeting. Mr. Hay has conducted flood studies on systems in southeastern Wisconsin and may prove to be an excellent resource as the group explores the use of flood modeling to evaluate the Yahara Lakes and basin.

**Assignment:** The group needs to identify possible presenters to explore the relationship between social and economic issues that may affect the group's decisions and project outcomes.

**4. Minute Corrections: This agenda item will be added to future meetings.**

- a. Bill Krug - See January 14<sup>th</sup> revised set of minutes
- b. Sue Josheff, WDNR - The Stoughton Dam does have an effect on the water levels upstream; but the final water levels are also a function of the concentration and abundance of weeds also effect the water levels.
- c. Ken Johnson - The placement of an acoustic velocity meter at the Tenney Lock should be re-evaluated and weighed against the benefits of measuring inflows and outflows.

**5. Presentation and discussion of stormwater infiltration applications – Ken Potter.**

**Abstract:** Standard methods of stormwater management do not sufficiently address increases in high lake levels due to urban and suburban development. Detention, by far the most common stormwater management practice, reduces the rate of stormwater runoff, but not the volume. Increases in runoff volumes cause increased flooding of downstream lakes, such as the Yahara lakes. Ken has been researching methods for using infiltration practices to reduce stormwater runoff volumes. Ken discussed the use of large-scale infiltration practices, such as infiltration basins, as well as small-scale practices, such as rain gardens. Infiltration basins have been used effectively in Long Island, New York, but may not be as effective in Wisconsin. Rain gardens and other small-scale infiltration practices may offer a more effective means of infiltrating stormwater runoff and have the potential to mitigate the increase in storm runoff volumes that result from development. However, their use requires further research and testing, as well as the development of appropriate regulations.



**Summary:** Infiltration basins receive runoff from relatively large areas. They often fail because of inadequate soil infiltration rates, impervious subsoil layers, shallow water table, groundwater mounding, subsurface clogging and compaction. Ways to avert these problems include careful site selection, removal of impervious soil layers, avoidance or mitigation of soil compaction, careful design to allow sufficient dry periods between storm events, pre-treatment practices to remove sediment, and periodic removal of accumulated sediments.

Small-scale infiltration practices are sited immediately downstream of impervious surfaces. They can be constructed higher in a watershed, where soil infiltration rates are generally higher and the water table is generally further below the surface. In addition, their design can reflect the specific quality of the water received. Examples of small-scale infiltration practices include avoidance of compaction of pervious surfaces, enhancement of the infiltration capacity of pervious surfaces, installation of rain gardens, minimization of the use of impervious surfaces, and installation of grassed swales and infiltration trenches.

Modeling the effectiveness of infiltration practices at UW: preliminary evidence indicates that infiltration can be effective in controlling run-off from a 6-inch storm to pre-development amounts in the following cases: 1) residential lot for which 1/3rd is impervious and 50% of the pervious surface receives runoff from the impervious surface 2) parking lot with rain gardens that equal 10% of the impervious area and 3) parking lot underlain by a 3-foot gravel layer with rain gardens directing water into gravel layer.

Mr. Potter's four-page handout will be available at the next meeting.

## **6. Rain gardens by Roger Bannerman – WDNR**

**Legislative Update:** Non-point source pollution rules were recently passed by the DNR Board and are expected to be promulgated by the legislature.

**Background:** Using infiltration to manage stormwater runoff is still fairly new to Wisconsin. However, places including, Maryland, Massachusetts, Washington, Vermont and California have all been using and experimenting with infiltration for at least 10 years. Roof gardens are being used in Sweden, Japan, Germany, and Chicago. Roof gardens use plants and evaporation principles to attenuate roof-top rainfall accumulation.

In Wisconsin, infiltration has been used in a few developments and demonstration projects are beginning to appear in isolated areas.

Studies have shown that fish populations decrease as the amount of impervious surfaces increase. Twelve years ago, infiltration was considered as a way to address efforts to restore the trout fishery in Black Earth Creek and a plan was developed. Implementation of the plan began approximately three years ago and included many stormwater management practices.

**Case Study - Cedar Hills:** This development included 75 residential lots on 35 acres and incorporated rain gardens for those lots that had a direct connection to a creek. Reducing street widths, constructing grass swales with curb/gutter and the installation of a detention basin also reduced runoff.

**Case Study – St. Francis:** A site on Brewery Creek in Dane County required rain gardens via deed restriction, infiltration trenches between streets, buffer zones on bank of the creek and two regional infiltration basins. Collectively, runoff was reduced 74% of pre-development.

**Case Study – Roger's Front Yard:** Mr. Bannerman has constructed a rain garden in his front yard and believes the garden is successfully infiltrating 16,000 gallons of water per year. The cost to install the garden was approximately \$10/sq ft.

## **7. Kevin Connors, Dane County Land Conservation – Erosion Control Ordinance.**

Kevin discussed the relationship between the erosion control ordinance and the feasibility of infiltration in Dane County. The Dane County erosion control ordinance has two distinguishable components - erosion control and stormwater management. Controlling erosion and sedimentation will have a direct effect on infiltration system longevity.

**Highlights of the ordinance:** The ordinance will require stormwater management plans for new impervious areas greater than 20,000 square feet and erosion control for land disturbance more than 4,000 square feet.

The need for a more restrictive stormwater/infiltration ordinance needs to be weighed against the ability to comply. Dane County soils are high in clay/silt content and the ability to incorporate infiltration into a stormwater management plan is limited by soil type and an understanding of long-term maintenance requirements.

Mr. Connors presented a map depicting probable substratum permeability of soils in the Dane County portion of the Yahara River Basin, based on the Dane County Soil survey. The map can be used to identify areas where infiltration may be a significant factor in stormwater management plans.

Dane County has also evaluated zoned wetland and hydric soil acreage for sub-watersheds in the Lake Mendota Watershed and provided the data in table form. Areas where infiltration may work need to be confirmed and incorporated in stormwater management plans.

The county has identified a concern with current version of the proposed NR 151, Wis. Adm. Code. This code establishes prohibitions and restrictions on infiltration according to the depth of groundwater and bedrock among other concerns. The proposed code may jeopardize the county's ability to adequately use infiltration as a stormwater management technique.

To illustrate, the county developed a map using soil survey data, depicting areas where the proposed code would prohibit using infiltration. The map shows that approximately 60% of the land area in Dane County would be unable to incorporate infiltration as a stormwater management technique due to minimum separation distances to bedrock and groundwater and fines passing the 200-micron sieve size.

Summaries of the ordinance and soils map were given to attendees - additional copies available on request.

## **8. Brett Husly, Dane County Supervisor – Reducing Floods in Dane County**

*Dane County is especially susceptible to flooding and appears on FEMA's list of high-risk flood areas going back to 1965. Efforts to reduce flooding in Dane County include smart growth development and strategies to restore the stormwater holding capacity of existing and drained wetlands.*

Floods impact family life and the economy. Currently, people who live in many flooded areas elsewhere are compensated for their losses or are paid to move out of the floodplain altogether. Approximately 13,000 homes and businesses were relocated after the floods of 1993.

In Dane County the most notable floods cost the following;

- a. 1993 - \$12 million
- b. 1996 - \$18 million
- c. 2000 - \$11 million, not including ag losses

TOTAL = \$41 million

Reversing wetland loss is an effective way to reduce flood frequencies. A study conducted by Dick Lathrop (WDNR) indicates that 70% of the wetlands in Wisconsin have been drained since the 1970's. In the Yahara

Lakes Basin there are approximately 36,000 acres of potential flood storage (assuming 2 acre-feet of storage on wetlands). Restoration would cost about \$36 million, assuming \$1000 per acre permanent easement cost.

Restored wetlands can also provide crucial habitat for fish and wildlife, groundwater quality improvement, and clean our rivers and lakes. A balanced approach to reducing floods will require infiltration, creation of storage, restoration of wetlands, relocation of families and removal of structures in the floodplain.

The number of extreme rain and snow events has increased by 20% since 1990, according to a NOAA study. There is growing concern that this increase may be the result of global warming.

#### **9. Next steps and future meeting dates.**

**Feb. 25, 6:30 p.m. – 9:00 p.m. at Dane Co. Public Works Administration Building**

March 18, 11:00 am to 1:30 p.m. at Dane Co. Public Works Administration Building

The February 25 meeting will have presenters on the social issues and sewerage issues. The Madison Metropolitan Sewage District (MMSD) and sewerage issues will be addressed by John Schellpfeffer. If time permits, the group will discuss the process to be used to make the advisory group's recommendations.

The March 18 meeting will have presentations on fiscal and economic issues. Ray Potempa and Aicardo Roa will have their economics presentation ready for that meeting. The group will start formulating their recommendations at that meeting.

#### **10. Public Comment.**

Nine members of the public attended and there were no comments.

#### **11. Other conversation or assignments**

**a.** Ray Potempa (FOLKS) and Aicardo Roa (Dane Co. LCD) will begin an economic study of the land around the lake. The study will also evaluate what would happen if a foot more of water is added to the lakes, the damage costs associated and the benefits lake property has to the current tax base. The location of floodplain homes and areas where infiltration is possible will also be assessed. For example, Ray Potempa has calculated that equalized value on Lake Kegonsa is approximately \$153 million.

Sue Josheff will contact Dick Lathrop about acquiring the 10 years of lake data he has been using in his models and studies. Sue Josheff, John Dunn and Larry Nelson will begin evaluating this data.



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## Yahara Lakes Advisory Group

### Meeting Agenda: February 25, 2002 (6:30-9:00 pm) Dane County Public Works Administration Building

1. Amendment and Approval of Minutes of February 4, 2002.
2. Review communication guidelines.
3. Presentation and discussion of Sewerage, Water Hydraulic, and Social Issues of the Yahara Lakes.

#### Sewerage Issues

**Presenter:** Jon Schellpfeffer, Madison Metropolitan Sewerage District, (608)222-1201 ext 266,  
[jons@madsewer.org](mailto:jons@madsewer.org)

##### *Sewerage Issues*

- What are the positive and negative effects of reintroducing Madison Metropolitan Sewerage District's effluent back into the lake/river system? How could it be made more acceptable?
- What is the relationship between lake levels and excess flows in the sanitary sewers?
- How can Madison Metropolitan Sewerage District's effluent be reintroduced into the northern part of the Yahara system in a cost effective way?

#### Discharge Capacities of the Yahara Lakes Hydraulic Structures

**Presenters:** John Dunn, Sue Joseff, and Larry Nelson

#### Social Issues

**Presenter:** Steve Born, Chair, UW Dept of Urban and Regional Planning, (608)262-9985,  
[sborn@facstaff.wisc.edu](mailto:sborn@facstaff.wisc.edu)

- Can we raise awareness of the lake flooding issue?
- Is it possible to increase the political will to address this issue?
- What kinds of methods and educational efforts can we use to inform the public of the need to spend money and take individual responsibility for stormwater?
- What is the possibility for developing the scenic beauty of the Yahara River system? What kinds of impacts would this be likely to have?

**Presenters:** Sergeant Dave Ritter, Dane County Sheriff's Dept, (608)284-6808,  
ritter.dave@co.dane.wi.us  
Sue Jones, Dane County Lakes and Watershed Commission, (608)267-0118,  
jones.susan@co.dane.wi.us

- What will be the restraints and regulations on recreational boating and enforcement if lake levels change?
- How will controlling water flow affect navigation on the Yahara River and lakes, if it is raised or lowered? Will there be traffic in areas that have little or none now?

**Presenters:** Yahara Lakes Advisory Group Members

- What are the natural resource constraints for minimum and maximum lake level requirements for the various user groups? Where is there flexibility? Where are they mutually exclusive?
4. Review of existing lake level orders. (Ken Johnson)
  5. Next steps and future meeting dates.
  6. Public Comment.

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**Yahara Lakes Advisory Group**  
**Meeting Minutes February 25, 2002 6:30 pm**  
**Dane County Public Works Administration Building**

Advisory group attendees: Margaret Andreasen, Eileen Bruskewitz, John Dunn, Bill Fitzpatrick, Don Hammes, Brett Hulsy, Ken Johnson, Sue Jones, Mike Kakuska, Dick Lathrup, Larry Nelson, Ray Potempa, Dave Ritter, Aicardo Roa, Jon Schellpfeffer, Dave Taylor, Kurt Welke, Jan Zimmerman

Agenda:

1. Amendment and approval of minutes of February 4, 2002
2. Review communication guidelines
3. Presentation and discussion of sewerage issues
4. Presentation of water hydraulics
5. Presentation of social issues of the Yahara Lakes
6. Review of existing lake level orders
7. Next steps and future meeting dates
8. Public comment

Change to the agenda: Steve Born, UW-Madison was to speak about social issues. He could not make the meeting. Mindy will try to reschedule him for the next meeting.

Mindy Habecker passed out a revised copy of the Yahara Lakes Advisory Group list with phone numbers and e-mail. Contact Mindy if you need a copy.

1. Amendment and approval of minutes of February 4, 2002.
  - Minutes approved with no changes.
2. Review of communications guidelines.
  - No changes
3. Sewerage Issues: presenter: Jon Schellpfeffer, Madison Metropolitan Sewerage District (MMSD)
  - Jon passed out 4 handouts (contact Mindy Habecker for a copy).
  - The first handout addressed the question: What is the relationship between lake levels and excess flows in the sanitary sewers? The table showed the flow rate increase in million gallons/day (MGD) based on storm intensity and Lake Monona level. This table came from "The Influence of Precipitation and Lake Level on Wastewater flow rates at the Nine Springs Wastewater Treatment Plant," Komilis, UW-Madison, 1995.
    - At the time of the study treatment rate was approximately 36 MGD, and it is currently approximately 42-44 MGD.
    - As the intensity increased and Lake Monona levels increased, the flow rate in sanitary sewer increased. At some point in the 2-10 year rain events flooding in the Lake Monona area takes place, and at certain lake levels the 5 and 10-year events lead to overflow at the MMSD plant.
    - The bottom line of this table is that we have no control over the intensity of rain events, but we can exert control over lake levels.
  - Handout 2 showed the service area for MMSD. MMSD services approximately 300,000 people. Discharges are into Badfish Creek south of Stoughton and to Badger Mill Creek in the Town of Verona.
  - Handout 3 was a table depicting effect of water diversion on Yahara River flows at McFarland. Remember that the Yahara Lakes area primarily uses groundwater that is used, treated and pumped out through MMSD, bypassing the Yahara Lakes. The table gave the probability that there will be no outflow from Lake Waubesa for 7 days, 60 days and 120 days. An example from the table: assuming a 38 MGD diversion today, there is a 47% probability of 7-day no flow.
    - There was a side discussion about the water quality of the MMSD discharge water. BOD (biological oxygen demand) is 3-5 parts per million (PPM), suspended solids 5-7 ppm,

phosphorus 0.3-0.5 ppm. The water is swimmable, boatable, etc but not potable. However, a point of reference, there is still a magnitude of difference in phosphorus currently in the lakes now versus the amount of phosphorus in the MMSD discharge water- still too high.

- MMSD is predicting in the future a 65-70 MGD discharge.
- MMSD still has an open channel to Nine Springs Creek and Lake Waubesa for emergency use.
- Handout 4 showed a picture of the MMSD Badger Mill aerator.
  - In 1993 Verona, who is serviced by MMSD and is a different watershed than Badfish Creek where the MMSD discharge water goes, wanted to tap into MMSD discharge water. Today MMSD returns approximately 3 MGD to the Sugar River basin via Badger Mill Creek.
  - It cost MMSD approximately \$4.75 million to build this system.
  - If want to discharge to the Yahara Lakes it's a different story.
    - Quality of the existing plant is not there yet. Tertiary treatment would be necessary. Technology to reach the proper water quality is available, but are people willing to spend the money? Conventional treatment plants cost approximately \$4-10 million/MGD. Tertiary treatment would cost at least double that.
    - Suggestion that pollutant trading might be looked at.
    - MMSD is looking in the next 10-20 years at having to redo the Waunakee and DeForest area sewers to expand capacity, etc. This could be the time to put some new technology in to meet these water quality standards.
  - One of the committee members asked about inflow treatment (clean the lake). This done in Germany and Sweden. This technology is very expensive, and people are willing to pay in those areas because the water is used for dinking water.
  - A question was asked about the feasibility of wetland treatment of effluent to get infiltration. This is done elsewhere, but this method doesn't work well to get rid of phosphorus.
  - Take home message: effluent could be a resource (technology is there) but it's a long way off and the quality of the water needs to be addressed-phosphorus probably can't be zero, but maybe watershed based trading could address it.
- 4. Presentation of water hydraulic issues: Presenters: Larry Nelson, John Dunn
  - Are there pinch points and are there areas that could pass more water?
    - The presenters feel that one pinch point is the river between Lake Waubesa and Lake Kegonsa.
    - Babcock and LaFollette dams: not a lot of hydraulic drop seen.
    - There is an almost 90 degree bend near the historic fish weir on the river, but this area is not necessarily a pinch point. There is a fair amount of rapids through there so there is some drop in elevation.
  - A proposal was made to place multiple staff gauges along the Yahara River and collect data (cross sections, velocity) to see where we could increase flow. There are 4 bridges involved so we can get good vertical control at those sites. This effort is a joint one with Dane County, City of Madison, and DNR. The advisory committee was in favor of this effort.
    - The effort needs to have 2 parts: data collection, hydraulic model to extrapolate to other years
    - This effort is long-term and won't have any information to guide decisions for 1-2 years
    - Comment was made to think about using riparian owners nearby as volunteers to collect data.
- 5. Presentation on some social issues; presenters: Sue Jones and Sgt. Dave Ritter  
Following is a copy of the text from their PowerPoint presentation:

## Effects on recreational boating and enforcement if lake levels change

Sgt. David Ritter

Sue Jones

### How many boats are using Dane County waters?

- 2001 state boater registration figures for Dane County follow

#### Water Craft

• Air Thrust	5
• Manual	285
• Propeller	20,508
• Sail Only	756
• Unknown	3150
• <u>Water Jet</u>	<u>1,148</u>
• Total	25,852

#### Boats By Type

• Cabin	1,187
• Canoe/Kayak	480
• House	19
• Inflatable	54
• Open	22,414
• Personal Watercraft	798
• Pontoon	541
• Sail boat	351
• <u>Unknown</u>	<u>8</u>
• Total	25,852

#### Total By Type Under 16 Feet

• Cabin	7
• Canoe/kayak	146
• House	1
• Inflatable	51
• Open	10,431
• Personal Watercraft	776
• Pontoon	9
• Sailboat	100
• <u>Unknown</u>	<u>1</u>
• Total	11,522



### **Total By Type 16 To 26 Feet**

• Cabin	968
• Canoe/kayak	334
• House	6
• Inflatable	3
• Open	11,922
• Personal Watercraft	22
• Pontoon	522
• Sailboat	237
• <u>Unknown</u>	<u>5</u>
• Total	14,019

### **Total By Type Over 26 Feet**

• Cabin	212
• House	12
• Open	62
• Pontoon	10
• Sailboat	14
• <u>Unknown</u>	<u>2</u>
• Total	312

### **Limitations of registration data**

- does not include all Dane County watercraft
  - sailboats <12 ft without motors
  - manually propelled without motor or sail
  - sailboards
- does not include all watercraft using Dane County waters
  - out of county & out of state boats.

### **High Water 2000**

- County Executive, County Board Chair and Sheriff can enact Emergency Wake Restrictions
- Causes both positive and negative reaction
  - Support for enactment
  - Increases volume of complaints
  - Creates inconsistency in enforcement
  - Increases enforcement cost

### **Potential trouble spots if levels were lower**

- Upper Yahara River channel to Mendota
- Lake Mendota “six pack”
- Shallow landings – difficult launching
  - Olin Park on Monona

- Gov Nelson State Park on Mendota
- inlet on Mendota, near Gov. mansion
- Entire Yahara River, except:
  - between Mendota & Monona
  - between Monona & Waubesa

### **Potential trouble spots if levels were higher**

- Yahara River
  - Tenny locks (esp. cabin boats)
  - Under Winnebago St. bridge on Isthmus
  - Under AB and 51 bridges (esp. cabin boats)
- Monona
  - Under Causeway bridge to Monona Bay, esp. center console boats

### **Increased traffic with higher/lower water?**

- Higher water – expect increase in Yahara River between Waubesa & Kegonsa
  - fishing boats
  - open construction boats
  - probably not a significant increase
- Lower water – expect more water-skiers in Monona Bay

### **Permanent regulation changes if levels changed?**

- Concern about exposure of higher, more erodible soils
- Riparian rip-rap, etc based on current levels and high water experience
- Any changes to rules would involve Lakes & Watershed Commission, and would need to be approved by County Board

#### **6. Review of existing lake level orders**

- Due to time constraints, this item was deferred to the next meeting.

#### **7. Next steps and future meeting dates.**

- March 18, 2002 (Monday) 11am-1:30 pm, Dane County Public Works Administration Building
- April 8, 2002 (Monday) 6:30-9pm Dane County Public Works Administration Building
- April 29, 2002 (Monday) 11am-1:30 pm Dane County Public Works Administration Building

A suggestion was made to convene an education subgroup now to talk about how to get recommendations, etc. out of the general public. Eilen Bruskevitz will convene. Ray Potempa, Sue Jones, Margaret Andreasen, Brett Hulsy, Don Hammes and Aicardo Roa volunteered to be on that subgroup.

#### **8. Public Comment**

- No public comment



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## Yahara Lakes Advisory Group

### Meeting Agenda: March 18, 2002 (11:00 am- 1:30 pm) Dane County Public Works Administration Building

1. Amendment and Approval of Minutes of February 25, 2002
2. Review communication guidelines
3. Presentation and discussion of social and economic issues of the Yahara Lakes

#### Social Issues

**Presenter:** Steve Born, Chair, UW Dept of Urban and Regional Planning, (608)262-9985, [smborn@facstaff.wisc.edu](mailto:smborn@facstaff.wisc.edu)

- Can we raise awareness of the lake flooding issue?
- Is it possible to increase the political will to address this issue?
- What kinds of methods and educational efforts can we use to inform the public of the need to spend money and take individual responsibility for stormwater?
- What is the possibility for developing the scenic beauty of the Yahara River system? What kinds of impacts would this be likely to have?

#### Economic Issues

**Presenter:** Kevin Connors, Director of Dane County Land Conservation Department, (608) 224-3731, [Connors.Kevin@co.dane.wi.us](mailto:Connors.Kevin@co.dane.wi.us)

- What is the estimated cost of making meaningful physical improvements of the drainage constrictions in the system?
- What is the cost of increasing the flood flow capacity in the Yahara River?
- Where are the flood plain homes located? How many are routinely affected by high water? Can some of these be moved out of harm's way?
- What financial programs are or will be available for upland management practices? What are the eligible practices and their benefits?

**Presenter:** Ray Potempa, Friends of Lake Kegonsa Society (FOLKS), (608)838-9329, [rjp3411@aol.com](mailto:rjp3411@aol.com)

- Can an economic study be done to demonstrate to the county the benefits of the lake to the tax base from lake front property owners and others?

**Presenter:** **Richard Bishop, UW Dept of Agricultural and Applied Economics, (608)262-8966,**  
[bishop@aae.wisc.edu](mailto:bishop@aae.wisc.edu)

- What is the economic value of the Yahara Lakes to the local economy? How is this affected by water quality – either good or bad?

**Presenter:** **Dave Janda, Assistant Director of Dane County Emergency Management, (608)266-9051,**  
[janda@co.dane.wi.us](mailto:janda@co.dane.wi.us)

- What is the cost to buy out the most flood-prone property vs. the cost to dredge or change water levels?
- With climate change, do we need updated flood insurance maps of riparian areas?
- When FEMA maps are updated, what is the effect of current flood policy on riparian land value and insurance costs?

**Presenter:** **Mike Kakuska, Dane County Regional Planning Commission, (608)266-9111,**  
[dcrpcadm@execpc.com](mailto:dcrpcadm@execpc.com)

- What is the economic contribution made by anglers and others using the lake to the local economy?

**Presenter:** **Ken Johnson, Basin Supervisor, WI Dept Natural Resources, (608)275-3243,**  
[johnsk@dnr.state.wi.us](mailto:johnsk@dnr.state.wi.us)

- What are the potential funding mechanisms to support the Yahara Lake Advisory Group's recommendations?

4. Review of existing lake level orders (K. Johnson)
5. Discuss possible recommendation evaluation criteria and decision-making processes
6. Next steps and future meeting dates
7. Public Comment

### **Directions to the Public Works Administration Building:**

This building is part of the Alliant Energy Expo Center Complex. Take Rimrock Road entrance to the Expo Center off the Beltline. Drive straight back to the last building on the left (it is a dark brick one story structure). If there is a paid parking event going on during this or any subsequent meeting we have scheduled there, tell the gate keepers that you are here for a government meeting at the Public Works Building. They will not charge you a parking fee.

**Yahara Lakes Advisory Group**  
**Meeting Minutes March 18, 2002 11:00 a.m.**  
**Dane Co. Public Works Administration Building**

**Advisory Group Attendees:** John Dunn, Sue Jones, Ken Potter, Ray Potempa, Bill Fitzpatrick, Larry Nelson, Ken Johnson, Mike Kakuska, Brett Hulsey, Don Hammes, Eileen Bruskewitz, Dave Taylor, John Van Dinter, Kurt Welke, and Mindy Habecker – facilitator.

1. **Review and Approval of Minutes of February 25, 2002.** Minutes approved as submitted.
2. **Review communication guidelines.**
  - One speaker at a time
  - Stay on task
  - Listen to learn, not to oppose
  - Everyone participates, no one dominates
  - Disagree without being disagreeable
  - Attack the problem, not the person
  - Respect time limits
3. **Presentation and discussion of social and economic issues of the Yahara Lakes – Steve Born, Chair UW Department of Urban and Regional Planning (608)262-9985 – [smborn@facstaff.wisc.edu](mailto:smborn@facstaff.wisc.edu):**

Development and climate are rapidly changing our watershed hydrology. The public will need to evaluate how it responds to this change by examining the associated social and economic impacts. What actually gets accomplished will depend on the ability of the community to effectively manage the conflicts that arise when social and economic changes are deemed necessary.

There are three kinds of conflict management which when factored together identify what actions will be accomplished or taken. These kinds include:

- a.) **Cognitive conflict:** Data collection and analysis needed to fully understand the problem.
- b.) **Interests or distributional conflict:** Identifies whose interests are served by both doing nothing and taking action. Decisions do not necessarily coincide with cognitive facts, as the actions must be acceptable to the array of affected parties.
- c.) **Value conflict:** The ideology of the parties at core of management conflict.

Balancing these three types of conflict among stakeholders will help identify solutions to the problems attempting to be addressed. Exposing the problem will identify and involve the stakeholders. All stakeholders should be invited to this forum including: bankers, realtors, builders, property owner groups, environmental groups, and land developers.

**Questions from agenda:**

- 1.) Raising the awareness of the public can be achieved by using media to the fullest extent by appealing to peoples interests and values (web site, papers, TV etc...).
- 2.) Changing the political will requires more than public awareness of the problem being addressed. Often changes in collective attitude or perception result in little change in public behavior. Changes in public behavior typically rely on the ability to get the issue on the political radar screen. Spurring action in the individual is not as effective as stimulating interest groups. Interest groups are the key to move politicians into taking action
- 3.) Agencies and organizations like UWEX and Dane County LCD should be used to educate the public and or media.
- 4.) A model, drawing, or visualization that the lake would look like completely developed could help build support for preserving the existing scenic beauty by teaching the public to look at the future of our

watershed. Restoration of urban waterways, the creation of greenways and the protection of wetlands will also improve the quality and scenic beauty of our watershed.

**Waters of Wisconsin:** Next October this statewide conference will highlight efforts being made to "future think" about Wisconsin's aquatic resources. A full evaluation of Wisconsin's current water policy and comparisons with other states is being conducted and a water protection "report card" is being developed.

**Assignment:** Steve would like the YLAG to help evaluate the hand-out - "Sustaining Wisconsin's Waters: A Checklist" regarding the issues being explored in our forum and provide feedback to him at [smborn@facstaff.wisc.edu](mailto:smborn@facstaff.wisc.edu)

**Summary:** The success of the YLAG will depend on the ability to create a ground swell of public action after calling attention to the facts and problem. The final outcome will depend on the decision maker's ability to successfully balance competing interests and values in a public decision making environment.

**Handouts:** 1.) Sustaining Wisconsin's Waters: A Checklist

## Economic Issues:

### 4. Kevin Connors, Director of Dane County LCD, (608)224-3731, [connors.kevin@co.dane.wi.us](mailto:connors.kevin@co.dane.wi.us)

An economic model can be developed to estimate costs associated with making meaningful physical improvements in the Yahara watershed. The economic model will have three primary elements.

- a.) Structural elements describe what the improvements will include and how the improvements can be installed.
- b.) Operation & maintenance elements will forecast how the improvements need to be managed to ensure effectiveness is maintained.
- c.) The improvements proposed would need to be evaluated with respect to their impact or perceived impact on public rights (e.g. drainage issue for farmers or length of pier rights for riparians).

There are few financial programs available that could be used for the type of improvements needed to make a positive impact on the Yahara River watershed. Some communities have used the Army Corps of Engineers (ACOE) 206 Program to help fund specific habitat improvement projects. Currently, the 206 program is being used for improvements to Token Creek, Lake Bellevue and Lake Koshkonong. The 206 program cost shares at 65 to 35%. Pending on habitat improvements, that would also benefit water level and quantities, the ACOE may be a consideration.

### 5. Ray Potempa, Friends of Lake Kegonsa, (608)838-9329, [rjp3411@aol.com](mailto:rjp3411@aol.com)

Ray and Aicardo Roa have compiled economic data that can be used as an additional tool to forecast and evaluate the benefits a given improvement may have on the watershed. The data includes all riparian property from Lake Mendota to the Kegonsa Dam (Cherokee Lake not included). Specifically, the data can be used to discern the following:

- a.) Who owns waterfront property (public or private)?
- b.) How are the owners of property distributed amongst the lakes? For example, of three fourths (¾) of the private riparian lakefront owners reside below Tenney Park and government owns 66% of all riparian property.
- c.) Are there differences in the way different municipalities manage publicly owned lakefront? Are there differences between municipalities and private riparians?
- d.) Are there disparities between property values from one lake to the next? From riparian to non-riparian parcels? How does this affect the tax base?
- e.) How will changes made to the watershed effect people's enjoyment of their property? Will property values be affected? Will environmentally sensitive areas be affected? For example, a modified water level regime may result in a large-scale change in pier lengths or the amount of shoreline exposed or

inundated. Changes in property values can be estimated under modified lake levels by using flood elevation data

f.) Flood elevations can be used to model water levels.

**Summary:** The data collected can be used to evaluate the economic contribution of riparians. When combined with elevation data, the riparian use and property value study can be used to analyze the economic impact of proposed lake level modifications.

Handouts: 1.) Slide show with tables showing economic value of riparian lands etc...

**5. Richard Bishop, UW Dept of Ag and Applied Economics, (608)262-8966, [bishop@ae.wisc.edu](mailto:bishop@ae.wisc.edu)**

Rich Bishop presented a survey that was conducted to estimate resident's willingness to pay for improvements to the Lake Mendota watershed. The survey used existing Lake Mendota water quality data to establish and illustrate the water quality problem. The public was asked how much they would pay to reduce phosphorus by 50%, which would reduce the number of summer algal bloom days from 50% to one bloom every five days. The results indicate that the public would be willing to pay approximately \$353.00 per household as a lump sum. The monies collected under this scenario far exceed what the WDNR has predicted it would cost to make said improvements (\$17.8 million for improvements compared to \$55 million predicted collection). These results indicate that the benefits of the Priority Watershed Program exceed the actual costs.

Handouts: 1.) The Economic Value of Water Quality Improvements in Lake Mendota Non-point Source Pollution and Present Values: A Contingent Valuation Study of Lake Mendota

**7. Dave Janda, Assistant Director of Dane County Emergency Management, (608)266-9051, [janda@co.dane.wi.us](mailto:janda@co.dane.wi.us)**

Dave Janda presented Dane County's flood mitigation planning process and timeline. The plan will include mitigation strategies and projects such as the purchase of lands that are continually flooded or dredging of stream channels. To develop a plan Dane County must adequately identify the problem, set goals and collect data to implement the plan. FEMA can pay up to 75% for select projects within the approved plan.

Changing climatic conditions will have significant impacts on flood frequencies in the Upper Midwest. Though not an exact science, climatic change modeling seeks to predict how regions will be affected under assumed climatic change conditions. It is currently predicted that precipitation in North America will be greater in the winter and lower in the summer. This is consistent with historical trends in Wisconsin with the added impact of heavier downpours and increased flood frequencies. It is possible to include these projections on the flood insurance rate maps. FEMA's 2003 budget request has \$350 million to update floodplain maps. FEMA will work with local governments to include future condition projections on the flood insurance maps.

While insurance cost may rise, there is currently no data to support the hypothesis that updated floodplain maps will result in property value reductions.

FEMA is aware of Dane County's floodplain study and will coordinate efforts as much as possible.

Handouts: 1.) Flood Mitigation Plan – Timeline  
2.) Potential Impact of Global Climate Change - Hydrology & Water Resources Federal Register, Vol. 66, No. 228/Tuesday, November 27, 2001

**8. Mike Kakuska, Dane County Regional Planning Commission, (608)266-9111, [dcrpcadm@execpc.com](mailto:dcrpcadm@execpc.com)**

**What is the economic impact or contribution by anglers and others using the lakes?**

Mike Kakuska summarized by saying he did not have that specific information and didn't think anyone did. There are multiplier affects through the economy and that the same dollar can turn over 3 maybe 4 times through stimulated economic activity by people who live here as well as those who vacation here. These activities provide a substantial base for tourism, recreation and the quality of life for people living and visiting here, which Mike did not think could be accurately measured. Complicating the equation even further is that we are not proposing draining the lakes. It then becomes a question of what are the marginal impacts of lake levels that are either too high or low for various activities during different times of the year? This is made tremendously more complex and variable from year to year because of weather. Do we need to know this specific information, and does one segment hold more economic importance than another? Do we need to commission a study to measure this? How should it be measured? Can it be measured? It is probably enough for our purposes to simply assume that the lakes are the very heart and lifeblood of the region. This is also a different kind of economic question than what probably should be asked, such as whether there are acceptable tradeoffs between the public expenditures to increase the outlet capacity of the Yahara Lake chain system versus the savings in property damages due to flooding. The Yahara lake chain is a very large and slowly responsive system. Public works staff do the best job possible with the limited tools available. More control over the system is needed to successfully address these problems. The limited capacity of the system to convey flow is the primary obstacle here.

Mike said he could provide a snapshot in time, more in terms of context. In 1995, the Lakes & Watershed Commission sponsored a Water Recreation Study. The purpose of the study was to better define and address the existing public attitudes and trends regarding the recreational use and management of the Yahara Lakes. Note, the focus was primarily recreation use by boat owners and landowners with a high interest/knowledge of the subject and, therefore, does not represent a cross-section of users. In terms of results, people are generally satisfied with recreational use on the Yahara Lakes, although there were some important trends/issues that were identified. The biggest problem was poor water quality and weedy areas. There are concerns about overcrowding as well as conflicts with other users. Respondents were fairly well satisfied with recreational support facilities/services (e.g., rest-rooms, warning systems, lake levels, etc.) There was substantial support and need to increase the Sheriff's patrols, as well as willingness to pay higher fees. Recreation expenditures were estimated for supplies and fuel. Mike indicated this probably underestimates the true economic value because it does not take into account the multiplier effect. Mike provided various other statistics contained in the report including lake access, boat registration, etc. There has also been a substantial decline in beach use, probably due to perceived decline in water quality, and that use of the lakes for fishing is increasing.

Recommendations in the report indicate a need to control NPS pollution. Continue to monitor recreation use, develop boating access and waterway protection plans. Consider expanding the boat patrol and law enforcement. Increase boater safety/training. Investigate the impacts of jet skis. Re-evaluate user fees to finance operation and maintenance (that people would be willing to contribute more). Finally, trends in boat sizes and motors should be monitored – larger boats and higher speeds are a concern.

**9. Ken Johnson, Basin Supervisor, WI Dept. Natural Resources, (608)275-3243, [johnsk@dnr.state.wi.us](mailto:johnsk@dnr.state.wi.us)**

Time expired – Ken will lead this discussion at the next meeting.

**9. Public Comment.**

Ten members of the public attended and there were no comments.

**10. Next steps and future meeting dates:**

**April 8, 2002. (6:30-9:00 pm)**

**Dane County Public Works Administration Building**

The next meeting will be the last of the information and education forums. We will be discussing recommendations in the meetings thereafter.





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## Yahara Lakes Advisory Group

### Meeting Agenda: April 8, 2002 (6:30-9:00 pm) Dane County Public Works Administration Building

1. Amendment and Approval of Minutes of March 18, 2002.
2. Review communication guidelines.
3. Presentation and discussion of Social and Economic Issues of the Yahara Lakes.

#### Social Issues

##### Presenters: Yahara Lakes Advisory Group Members

- What are the natural resource constraints for minimum and maximum lake level requirements for the various user groups? Where is there flexibility? Where are they mutually exclusive?

#### Economic Issues

##### Presenters: Larry Nelson, City of Madison Engineer, (608)267-4227, [lnelson@ci.madison.wi.us](mailto:lnelson@ci.madison.wi.us)

- What is the annual cost of flood damage over time? What are the trends?
- What are the economic issues of flooding on each individual lake?
- What are the costs both private and public of the major floods in the past decade, especially the floods of 1993, 1996, and 2000?
- What are effects of changes to the lake operation rules on riparian property owners, economically and recreationally?
- What is an appropriate social policy concerning flood events (what are the consequences and cost/benefits)?
- Will/can county and local governments design stormwater systems to prevent flooding?

4. Review of existing lake level orders (K. Johnson)
5. Discuss possible recommendation evaluation criteria and decision-making processes.
6. Report from Education Subcommittee (Eileen Bruskevitz)
7. Next steps and future meeting dates.
8. Public Comment.

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# **Yahara Lakes Advisory Group**

## **Meeting Minutes April 8, 2002 6:30-9:00 p.m.**

### **Attendees**

Margaret Andreasen	Eileen Bruskewitz	John P. Dunn
Bill Fitzpatrick	Don Hammes	Brett Hulsey
Ken Johnson	Sue Jones	Mike Kakuska
Dick Lathrop	Larry Nelson	Ray Potempa
Aicardo Roa	Dave Taylor	Jon Schellpfeffer
Jan Zimmermann		

Facilitator - Mindy Habecker and four members of the public

### **Minutes**

The minutes from the February 25, 2002 meeting were accepted with the following amendments.

- Mike Kukuska's presentation had a handout.
- Water levels affect the fishery and spawning - lower water levels decrease spawning success. The system could require more stocking or there could be will less fish available.

### **Communication Guidelines**

One speaker at a time  
Stay on task  
Listen to learn, not to oppose  
Everyone participate- no one dominate  
Disagree w/o being disagreeable  
Attack the problem - not the person  
Respect time limits

### **Natural Resource Constraints for Minimum and Maximum Water Levels**

#### **Where is there flexibility? Where are they mutually exclusive?**

The group brainstormed these questions and identified the following-

#### Lake Mendota

- Need to maintain current uses - fishery, aesthetics, shoreline
- Properties have the highest value and taxes of the four lakes
- Need to increase storage upstream because of development potential
- Increase conveyance out of the dam - the Yahara River downstream of the dam will flood
- High levels cause destruction of wetlands
- Development causing increasing stormwater to lakes
- 1993 - 2000 lake levels excessive - damage threshold elevation is not known
- Water level order doesn't directly address floods
- Elevation of dam's embankment is low
- High levels cause shoreline erosion and damage to vegetation
- Water levels need to be predictable
- There is a perception that there is water control and that the maximum and minimum water levels will be maintained
- Navigation - too high and boats can't get under bridges, too low and boats can't access particular areas
- Capacity of the system can be increased at Mendota & Stoughton
- Water level orders requires that ice is off before refilling to get water into marshes for fish spawning - this reduces spring flooding storage
- Many of the conditions found on Lake Mendota can apply to Lakes Monona, Waubesa and Kegonsa.

### Lake Monona

- Better sewerage, etc. data - public health concerns start at elevation 846 - don't know where sewer infiltration comes from, greater cost to MMSD during flooding  
Have approximately two events of overflow at plant per year-
- Basement sewerage back up is a problem with flooding
- There was a handout on when the problems begin for sewer back-up
- Navigation - similar to Mendota
- Beach closure due to sewerage discharge
- Many buildings built to 100-year + 2'

### Lake Waubesa

- Navigation - similar to Mendota
- Marsh bogs breakoff during high water
- Boat landings effected by varying water levels

### Lake Kegonsa

- Navigation - similar to Mendota
- State park beach and boat launch - need to have accessible
- Basement - sumps and pumps
- High water levels can effect the Door Creek Drainage District's drainage

<b>Lake</b>	<b>Lake Area in sq. miles</b>	<b>Volume of Top One Foot in million cu. feet</b>	<b>Volume of Top One Inch in million cu. feet</b>
Mendota	15.38 (or 9,843 acres)	430 (or 3.2 billion gallons)	36 (or 269 million gallons)
Monona	5.12 (or 3277 acres)	143 (or 1.1 billion gallons)	12 (or 90 million gallons)
Wingra	0.74 (or 474 acres)	21 (or 0.16 billion gallons)	2 (or 12 million gallons)
Waubesa	3.25 (or 2080 acres)	91 (or 0.68 billion gallons)	8 (or 60 million gallons)
Kegonsa	5.01 (or 3206 acres)	140 (or 1.0 billion gallons)	12 (or 90 million gallons)
<b>TOTAL</b>	<b>29.50 (or 18880 acres)</b>	<b>825 (or 6.2 billion gallons)</b>	<b>70 (or 524 million gallons)</b>

### **Yahara River @ McFarland**

	<b>Q<sub>7,2</sub></b>	<b>Q<sub>7,10</sub></b>
Pre- MMSD Diversion (1912 - '59)	36.0 cfs	16.6 cfs
Post - MMSD Diversion (1960- '74)	14.6 cfs	5.6 cfs

### **Ken Johnson's presentation**

- Update mission was passed out but not discussed. A copy is provided at the end of the minutes.
- Copies of the current water level orders governing the dams' operation were distributed but not discussed other than in the context of the presentation.

Ken presentation covered three topics - copies of the presentation were passed out.

### Potential funding sources

- Waterway Commission
- Urban Stormwater  
TRM  
Urban Non-point
- Stewardship  
Stream Bank Protection for Non-profits

## Urban Rivers

### Shoreland Enhancement

- Local Park Aids Acquisition and Development
  - River and Lake Planning Grants
  - COE Planning Grants
- Non-profit and Lake Associations
  - Towns, Cities, Villages, County
  - USGS gaging
  - DNR Fish SEG funds
  - Fish & Wildlife Grants
  - EPA

Other advisory members added these possible sources

COE 206 aquatic restoration

Private sources

CREP

### Lake Orders and Recorded levels

Ken showed graphs of the actual water levels in relation to the water level orders and the success of Northern fish spawning. Lake Mendota water levels appeared to affect northern fish spawning success but the Monona water levels didn't show the same fish spawning correlation.

Lake Monona Winter statistics in the presentation are not correct.

Ken was asked if this analysis hold for other game fish and stated that it was an indicator.

Dick Lathop 'eyeballed' a general conclusion - water level going up in the spring improves spawning. Ken pointed out that the water levels had to correlate to the ripe females.

### **Larry Nelson's Presentation - Economic Issues**

Larry was asked to help determine a Stage-Damage relationship for flooding on the lakes. Larry pointed out that Dane County Emergency Management is doing a Flood Mitigation Plan. David Janda, the county coordinator was present. A survey will be distributed to help gather flooding problem/damage information.

Dane County has a new digital terrain model. City of Madison staff provided the lake basin divides that take into account surface and stormwater drainage. Dane County will map areas in 6-inch elevation intervals above the lake levels. The parcel data layer will be added to the 'flooding' intervals to project the flood damage for each 6-inch increase in lake levels.

Larry also pointed out that lakefront property owners are a special kind of citizen - they don't complain much therefore we don't have good data on their damages from the high water.

In the high water of 1993, 1996 and 2000, there was a million dollars in public damages to the shoreline. The City of Madison has started the repairs along Monona Bay. The City intends to raise the shoreline to one-foot above flood elevation and protect it with riprap.

In calculating the damages, we do have the empirical information developed by MMSD relating sewer backups and lake elevations.

Larry pointed out that most new development areas are flood proofed. Some areas still have flooding problems from the accumulation of stormwater and others with sanitary sewer back up.

## **Education Committee Report**

Eileen Bruskewitz reported that the Education Committee met once and the next meeting is scheduled for April 10 at 11:00 at the DNR office. The committee has identified some of the key stakeholders. The committee suggests that a packet of information be assembled containing summaries of the speakers' presentations and the handouts to be available to the public.

The committee sees the Rock River Basin educator position to important to the development of the informational materials and to implement outreach.

The committee is planning to kick-off activities on June 15 to correspond with Yahara Lakes Week. There will be a Parade of Rain Gardens. The committee is looking for partners.

Sue Jones stated that the Dane Co. Flood Mitigation Plan may also piggyback on the Yahara Lakes Week to start an awareness of the flood plan.

John Dunn announced that the "Lakes' website should be up by May 1. It will include information on water levels, the level orders, weed-cutting, etc.

## **Decision Making Process and Method for Recommendation Evaluation**

Mindy's handed out a proposal for the decision-making process. She questioned whether the group needed to address flexible or mutually exclusive issues of natural resource constraints for lake levels before the group goes on to make recommendations. The group felt they were ready to move to recommendations.

The criteria for a recommendation will be discussed through e-mail. Specifically - what consensus is needed for an idea to become a group recommendation?

It was pointed out that different criteria were used in each of the previous situations that have used this framework (i.e. dredging of the Upper Yahara, Rockdale Dam removal and Shorewood stormwater tunnel).

## **Miscellaneous**

Does DNR know about the proposed new lake by Midland Builders? Yes

Kurt Welke needs to evaluate if low flow is critical and the impact of the Badfish Creek diversion? Lake Mendota can be used to store water and augment low flow. That would have to be recognized in the water level orders if the low flows are critical.

A natural hydrograph was mentioned as probably best for habitat. Better coordination at each of the dams would be needed.

**Next meeting** - Monday, April 29<sup>th</sup> from 11:00 am -1:30 pm at the Dane County Public Works Administration Building.



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## **Yahara Lakes Advisory Group**

### **Meeting Agenda: April 29, 2002 (11:00am- 1:30 pm) Dane County Public Works Administration Building**

1. Amendment and Approval of Minutes of April 8, 2002.
2. Review communication guidelines.
3. Discuss recommendation evaluation criteria and decision-making processes.
4. Generate proposed recommendations.
5. Next steps and future meeting dates.
6. Public Comment.

#### **Directions to the Public Works Administration Building:**

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## Yahara Lakes Advisory Group Meeting Minutes April 29, 2002 11 a.m.

Minutes of the April 8, 2002 meeting approved. Habecker reviewed the communication guidelines and decision-making, evaluation criteria for developing recommendations to address the group's mission. Afterwards the group generated proposed recommendations that are listed on the following table. The next meeting date was set for May 13, 2002 from 5-9 p.m. at the Dane County Public Works Administration Building.

No	Lakes Management & Operations	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	All control structures be unified under a coordinated and recordable management strategy					
2	Yahara base flows to be restored at a level where the probability of no or extreme or low flow scenarios are avoided					
3	Establish a process to repair or compensate riparian property damaged by flooding					
4	Increase outlook capacity of conveyance channels					
5	Lake operation rules must provide for stable and predictable lake levels that are protective of public and private properties, wetland, shorelines, fisheries, water quality and recreational users					
6	Lake Mendota should have a one foot level between the minimum summer and the maximum summer					
7	Consider using highly treated wastewater effluent to restore the water balance in the Yahara River and lake system					
8	Redesign railroad crossing structures to increase the flow rate there by reducing the associated heads					
9	Design orders to address all four seasons, not just summer maximum and winter minimum					
10	All dams on the Yahara River should be operated in a coordinated fashion including the Stoughton Dam					
11	Limit discharge rates from Mendota to equal discharge rates at Stoughton					
12	Develop lake and shoreline regulations affecting all riparians, both public and private, in a uniform way					
13	The DNR orders should contain flexibility to given water levels since the Yahara Lakes historically have been operated outside of the current borders.					
14	Dane County and DNR fisheries should coordinate water levels in the spring for the system's fishery					
15	Recommend that winter minimum lake levels be kept at the upper level of their range (highest elevation) especially for the period from March 1 <sup>st</sup> on					
16	Establish a structure and process for planning and funding capital improvement and maintenance of flood control and navigation structures on the Yahara Lakes (i.e. locks, dams, conveyance channels)					
17	Establish specific processes for responding to flooding that better coordinates actions by all levels of government to minimize property damage, water quality impacts, impacts on fisheries and set specific standards for use restriction on recreational users necessary to protect property and the environment					
18	Dredge the lower portions of the Yahara Chain to increase flow					
19	Maximum flood level on Lake Mendota should be established					
20	Maintain the lake levels at or below the ordinary high water mark during the summer months					
21	Adjust lake levels to assure at a minimum current property values and uses					



22	Ultimate development of the basin needs to be factored into the flood evaluation and lake operating rules					
23	The increase in the flood flows from Mendota and Kegonsa needs to be formally evaluated of part of the lake level evaluation					
24	A flood management plan shall be developed with shoreline protection elevations					
25	A lake system management plan needs to be developed which would be able to articulate responses to various scenarios					
26	Provide additional resources for weed cutting. Dedicate an entire crew on the Lower Yahara River between Waubesa and Kegonsa.					
27	Minimum flows at all dams in the system should be reexamined and reset to reflect the needs of the river					
28	Set up a quick response team consisting of county and local municipalities to respond when water is high					
29	Examine the feasibility of adding additional flood protection and flood proofing on Lake Monona					
30	Winter levels should move to summer levels on all lakes after ice out or snowmelt.					
31	Lake levels in the Madison Chain of Lakes and particularly Lake Mendota must remain high enough from March 15 to mid-May to allow fish to spawn, young fry to grow to sufficient size to survive once water levels are lowered. The lake levels during this period should be at ____ elevations.					
32	Do not begin to draw down the level of Lake Mendota in order to retain safe passage of boats and get all those on and off the lifts on all lakes.					
33	Develop boating access and water way protection plans to enable state funding assistance to local units of government					
34	Reevaluate user fees to find the finance operations and maintenance of boat launch facilities and locks					
35	Maximize the discharge from the lakes during flood conditions by pursuing the following: lowering the water level in the Stoughton millpond or run free-flow conditions and Babcock and Kegonsa until all lakes are below summer maximums					
36	Operate dams to reflect continuous smooth discharge					
37	Install automatic gate operations at Kegonsa and Babcock lock and dam					
<b>No</b>	<b>Monitoring/Modeling</b>	<b>Strongly Agree 2</b>	<b>Agree 1</b>	<b>Neutral /Abstain 0</b>	<b>Disagree -1</b>	<b>Strongly Disagree -2</b>
1	Complete build-out scenarios be promptly prepared to evaluate projected delivery rates of runoff, nutrients and sediments in order to plan for and mitigate future impacts					
2	Maintain an active monitoring program on the lower Yahara River to obtain accurate data					
3	Support engineering study of lower Yahara reaches for five years of data acquisition					
4	Over a five to ten- year period model the Yahara River channels to find areas for physical improvement and to determine cost and find funding necessary to build improvements					
5	Newest technology needs to be monitored and explored in relation to specific water levels					
6	Need to implement monitoring strategies to identify all the specific variables now affecting lake levels and to create a model that facilitates predictability					
7	Reconvene Yahara Lakes Advisory group or modified group to evaluate and act on the flow measurements, data, provide education, and monitor progress of recommendations after one year					

8	Use the calibrated Yahara Lakes model currently under development to optimize management of Yahara Lake system and to achieve multipurpose objectives					
9	Promote and continue development of a river gauging network for the Yahara Lake system					
10	Install flow monitoring devices at Kegonsa Dam					
11	Monitor and evaluate the trends and use by various user groups					
12	Dane County, the DNR, and the USGS should continue the 2002 proposed monitoring of the Waubesa/Kegonsa/Yahara River channels and report back to our Yahara Lakes Advisory group with its findings					
13	Promote the development of an electronic lake management system, linking model data with real-time USGS flow and lake stage data provided daily					
14	Monitor spawning beds for water depth to let county and state staff know when high water is needed					
15	A continuous rainfall runoff model should be developed for the entire system. Rain gauges should be installed throughout the watershed that could be used as input to the operator of the model					
16	Implement demonstration practices that are equipped with monitoring capabilities so that their effectiveness can be assessed					
17	Develop a continuous hydraulic/hydrologic model of the watershed including the lakes and connecting channels that can account for present and potential land use conditions and land management practices in the watershed and the potential modification of control structures and channels					
<b>No</b>	<b>Land Use</b>	<b>Strongly Agree</b> <b>2</b>	<b>Agree</b> <b>1</b>	<b>Neutral /Abstain</b> <b>0</b>	<b>Disagree</b> <b>-1</b>	<b>Strongly Disagree</b> <b>-2</b>
1	Require full infiltration from all new development either onsite or nearby. Be stormwater neutral (no runoff)					
2	Dane County and municipalities commit to long term goal of no net increase in the total volume of stormwater runoff					
3	County/city tax revenues be directed at establishing to full-time lake keepers to monitor and enforce stormwater ordinances					
4	Municipalities including cities, inventory, report on and institute possibilities for stormwater infiltration beyond that which is in place					
5	A standard watershed-wide legal ordinance be instituted to infiltrate runoff from impervious surfaces at a target level					
6	Low lying riparians be approached to obtain future easements fee ownership of their property in order to revert it to public ownership					
7	Offer voluntary matching money to elevate or buyout existing flooding homes					
8	Opportunities to significantly increase the infiltration of stormwater and snow melt into the groundwater should be identified and emphasized to all areas that significantly impact lake levels					
9	Encourage the use of rain gardens. Investigate how much they contribute to solving the problem.					
10	Commercial, industrial and residential development north of Lake Mendota, should if necessary, be restricted by zoning to minimize the impact of stormwater runoff caused by development into the Yahara Lake system					
11	Planning and new laws be introduced to reduce stormwater volumes delivered to the Yahara Lakes					

12	Create environmental TIF (tax incremental financing) districts					
13	Efforts may be made within public ownership along the lakefront to restore predevelopment vegetation communities and restore fish and wildlife habitat					
14	Control the inflow of fertilizer and waste products from surrounding farmlands into the Yahara system					
15	Develop upstream stormwater retention systems to hold back water from entering the downstream waterways					
16	Develop stricter regulations regarding “catch basins” and new developments to better control rate of water flow into the system and diminish odds of flooding					
17	Zoning regulations for building in the watershed should assess the impacts on the lakes as well as on land. All stakeholders benefits need to outweigh the individual’s advantage					
18	New developments within the basin should be designed to reduce flood flows or at the very least, not increase downstream discharge					
19	Stop the draining of wetlands for either farming or development					
20	Ensure new developments adhere to current standards of control to prevent sediment and erosion into the system					
21	Strengthen county stormwater ordinance to control floodwater from the real 100-year rain event using current rainfall information					
22	Restore wetlands to improve lake quality and natural habitat					
23	Restore drained wetlands in the Lake Mendota Basin to store flood water and reduce pollution with a goal of restoring 20-30,000 acres.					
24	Develop a county internal consolidation between Land Conservation Department, Lakes and Watershed Commission and Parks Department					
25	Add and expand stormwater detention capacity in existing communities to reduce flood runoff					
26	Setup a purchase and/or transfer development rights program to reduce the development footprint north of the lakes in high flood areas					
27	Update the 100-year flood maps and end new building in 100-year floodplain area					
28	In developing lake level orders consider the aesthetic effects of proposals as well as the interests of individual stakeholders and ecological health					
<b>No</b>	<b>Education</b>	<b>Strongly Agree 2</b>	<b>Agree 1</b>	<b>Neutral /Abstain 0</b>	<b>Disagree -1</b>	<b>Strongly Disagree -2</b>
1	Establish criteria for determining feasibility and practicality of solutions					
2	A small percentage of “lake tax” be applied to all watershed residents as a foundation to fund lake restoration and improvement work					
3	Increase awareness of lake and watershed issues among the general public					
4	Residents and businesses that are located in high flood-prone areas should be notified each year of continuing trends of rising lake levels that jeopardize the continued existence of their structures. There should be no surprises if flooding occurs					
5	Enforce littering rules/laws by boat ramps, bridges, and fishing spots. Serve fines and use money for cleanup					
6	A well-planned effort should be made to communicate all key recommendations to officials in the general public via e-mail, brochures, newsletter and other publicity					

7	A communication and education director should be appointed to promote understanding of the lake level issues and coordinate citizen efforts to maintain healthy lake levels and prevent flooding					
8	Recommend a public education by an ongoing result of our meetings, such as using a floating classroom, materials available to the public schools					
9	Engage the development in real estate industry to be involved in implementing best practices in water, lake, land management					
10	Continue the Yahara Lakes website and promote its usefulness to the general public					
11	Dane County Public Works should have a web page that displays the current operating status of all the dams on the river					



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## **Yahara Lakes Advisory Group**

### **Meeting Agenda: May 13, 2002 (5:00 pm- 9:00 pm) Dane County Public Works Administration Building**

1. Amendment and Approval of Minutes of April 8, 2002 and April 29, 2002.
2. Announcements.
3. Review communication guidelines.
4. Review recommendation evaluation criteria and decision-making processes.
5. Discuss and vote on proposed recommendations.
6. Next steps and future meeting dates.
7. Public Comment.

**Next meeting is scheduled for: Wednesday, May 22, 2002 at 6:30pm.**

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**Yahara Lakes Advisory Group  
Meeting Minutes May 13, 2002 5:00 p.m.**

**Attendees**

Margaret Andreasen	Eileen Bruskwewitz	John P. Dunn
Bill Fitzpatrick	Don Hammes	Brett Hulsey
Ken Johnson	Dick Lathrop	Larry Nelson
Aicardo Roa	Dave Taylor	Jon Schellpfeffer
Jan Zimmermann	Ray Potempa	John Van Dinter

Kurt Welke

Facilitator - Mindy Habecker and one member of the public

1. Amendment and approval of April 8, 2002 meeting minutes
2. Announcements:
  - Tuesday, June 25, 10:00am canoe trip of “problem” areas (June 26 rain date). Will put in at McFarland locks with lunch at Fish Camp. Arranged by Marcia Hartwig, Dane Co. LCD and Dick Lathrop. Signup sheet went around. Contact Marcia (224-3730) if interested.
  
  - Outreach Kickoff Event: June 12, 6:00pm-9:00pm at Olbrich Gardens. Format: Speakers and presentation of recommendations with displays from groups who participated in the advisory group. Packet of information will be available. The target is riparians, the press and elected officials.
  
  - Lakes website for the County is up and running: [co.dane.wi.us/pubworks](http://co.dane.wi.us/pubworks)  
Click on the lakes division.
3. Next meeting: Wednesday, May 22, 2002 6:00pm – 9:00pm at the County office, Expo Center. Plan to plow through the monitoring/modeling, land use, and education sections to review/revise and vote on all recommendations.

Below is the revised chart of recommendations. At this meeting the first section, Lakes Management and Operations, revisions were completed. The color and symbol codes are as follows:

- a. Parts in **blue and underlined** are completely new recommendations (recommendations completely rewritten).
- b. Parts in **red and underlined** are new parts, words, etc.
- c. All **underlined** parts are new (for those printing in black and white).
- d. Parts eliminated are shown in ~~strikethrough~~.
- e. All comments are *italicized*.

## Yahara Lakes Advisory Group Proposed Recommendations

No	Lakes Management & Operations	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	All control structures <del>from Lake Mendota to below the Stebbinsville Dam</del> be unified under a coordinated and recordable management <del>strategy based on a lake system management plan to be developed which would be able to articulate responses to various scenarios such as development of the basin.</del>					
2	Yahara base flows <del>to be restored</del> <u>be maintained</u> at a level where <del>the probability</del> of no or extreme or low flow scenarios are avoided					
3	Establish a process to repair or compensate riparian property damaged by flooding					
4	<del>Increase outlook capacity of conveyance channels</del> <u>Evaluate methods such as modification of bridge constrictions, aquatic plant modification, dredging, channel modification, etc. to increase flow conveyance and make recommendations where cost effective.</u>					
5	<del>Lake operation rules</del> <u>Operations rules for the lakes</u> must provide for stable and predictable lake levels that are protective of public and private properties, wetland, shorelines, fisheries, water quality and recreational users					
6	<del>Lake Mendota should have a one foot level between the minimum summer and the maximum summer</del> <u>Change the summer minimum from 849.6 to 849.1 to allow for greater possible flood storage.</u>					
7	Consider using highly treated wastewater effluent to restore the water balance in the Yahara River and lake system					
8	<del>Redesign railroad crossing structures to increase the flow rate there by reducing the associated heads</del> Combined with #4.					
9	Design orders to address all four seasons, not just summer maximum and winter minimum					
10	<del>All dams on the Yahara River should be operated in a coordinated fashion including the Stoughton Dam</del> <u>Deleted. Same as #1</u>					
11	<del>Limit discharge rates from Mendota to equal discharge rates at Stoughton</del> <u>Combined with 19, 23. And 35.</u>					
12	Develop lake and shoreline regulations affecting all riparians, both public and private, in a uniform way					
13	The DNR orders should contain flexibility to given water levels since the Yahara Lakes historically have been operated outside of the current borders.					
14	Dane County and DNR fisheries should coordinate water levels in the spring for the system's fishery					
15	Recommend that winter minimum lake levels be kept at the upper level of their range (highest elevation) especially for the period from March 1 <sup>st</sup> on					
16	Establish a structure and process for planning and funding capital improvement and maintenance of flood control and navigation structures on the Yahara Lakes (i.e. locks, dams, conveyance channels)					

17	Establish specific processes for responding to flooding that <del>better coordinates actions by all levels of government to minimize property damage, water quality impacts, impacts on fisheries and set specific standards for use restriction on recreational users necessary to protect property and the environment</del>					
18	<del>Dredge the lower portions of the Yahara Chain to increase flow</del> <i>Eliminate – combined with #4</i>					
19	<del>Maximum flood level on Lake Mendota should be established</del> <i>Eliminate - combined with 11, 23, and 35</i>					
20	Maintain the lake levels at or below the ordinary high water mark during the summer months					
21	<del>Adjust lake levels to assure at a minimum current property values and</del> <i>uses Consider property values and uses in adjusting lake levels.</i>					
22	<del>Ultimate development of the basin needs to be factored into the flood evaluation and lake operating rules</del> <i>Eliminate- part of #1</i>					
23	<del>The increase in the flood flows from Mendota and Kegonsa needs to be formally evaluated of part of the lake level evaluation</del> <i>Eliminate – combined with 11, 19, and 35</i>					
24	A flood management plan shall be developed with shoreline protection elevations					
25	<del>A lake system management plan needs to be developed which would be able to articulate responses to various scenarios</del> <i>Eliminate – part of # 1</i>					
26	<del>Provide additional resources for weed cutting. Dedicate an entire crew on the Lower Yahara River between Waubesa and Kegonsa.</del> <i>Eliminate – part of # 4</i>  <i>The Lakes and Watershed Commission is also dealing with this issue.</i>					
27	<del>Minimum flows at all dams in the system should be reexamined and reset to reflect the needs of the river</del> <i>Eliminate – part of #r 2</i>					
28	<u>Establish a quick response team comprised of local and county officials to prepare and respond to flood conditions. The team should be assembled when the static lake level exceed the OHWM on any of the lakes.</u>  <del>Set up a quick response team consisting of county and local municipalities to respond when water is high</del>					
29	Examine the feasibility of adding additional flood protection and flood proofing on Lake Monona					
30	<del>Winter levels should move to summer levels on all lakes after ice out or snowmelt.</del>  <i>Eliminate-part of # 1</i>					
31	Lake levels in the Madison Chain of Lakes and particularly Lake Mendota must remain high enough from March 15 to mid-May to allow fish to spawn, young fry to grow to sufficient size to survive once water levels are lowered. <del>The lake levels during this period should be at _____ elevations.</del>					



32	Do not begin to draw down the level of Lake Mendota <u>until October 30</u> in order to retain safe passage of boats and get all those on and off the lifts on all lakes.					
33	<del>Develop boating access and water way protection plans to enable state funding assistance to local units of government</del>  <i>Eliminate – Confusing</i>					
34	Reevaluate user fees to find the finance operations and maintenance of boat launch facilities and locks					
35	<del>Maximize the discharge from the lakes during flood conditions by pursuing the following: lowering the water level in the Stoughton millpond or run free flow conditions and Babcock and Kegonsa until all lakes are below summer maximums</del>  <i>Combined with 11, 19, and 23</i> <del>Maximum flood level on Lake Mendota should be established</del> <del>Limit discharge rates from Mendota to equal discharge rates at Stoughton</del>  <u>When the level of Lake Mendota rises above the OHWM (850.7 MSL) a state of high flow shall be declared. This state of high flow will remain in effect until all the lakes in the chain are at or below their maximum summer operating level. A declared state of high flow will result in 1. The Babcock and LaFollettee Dams discharging under free flow conditions (without stoplogs) and the Stoughton Dam increasing discharge in order to maximize discharge at LaFollettee. During this period of declared high flow the Stoughton dam’s minimum operating level will not apply. The discharge of the Stoughton dam will be increased until the flow at the LaFollettee dam is unaffected by downstream conditions (or until some upstream restriction becomes apparent). 2. Discharge of the Tenney Park Dam will consider flow conditions at the LaFollettee Dam and will operated in order to maximize discharge (downstream channel bank full) at the lock but not exacerbate flooding on the downstream lakes as long as dam conditions at Tenney are deemed safe (2000 flood levels minus six inches). When levels of Lake Mendota approach unsafe conditions the gate setting at the Tenny Dam shall be increased to prohibit any increasing in the lake level of Lake Mendota.</u>					
36	Operate dams to <u>mimic natural river flows</u> <del>reflect continuous smooth discharge</del>					
37	<del>Install automatic gate operations at Kegonsa and Babcock lock and dam</del> <u>Evaluate the need to renovate Tenny, Babcock and LaFollettee Lock and dams. The evaluation should include the possibility of automating the gates at one or all of the dams.</u>					

No	Monitoring/Modeling	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	Complete build-out scenarios be promptly prepared to evaluate projected delivery rates of runoff, nutrients and sediments in order to plan for and mitigate future impacts					
2	Maintain an active monitoring program on the lower Yahara River to obtain accurate data					
3	Support engineering study of lower Yahara reaches for five years of data acquisition					
4	Over a five to ten- year period model the Yahara River channels to find areas for physical improvement and to determine cost and find funding necessary to build improvements					
5	Newest technology needs to be monitored and explored in relation to specific water levels					
6	Need to implement monitoring strategies to identify all the specific variables now affecting lake levels and to create a model that facilitates predictability					
7	Reconvene Yahara Lakes Advisory group or modified group to evaluate and act on the flow measurements, data, provide education, and monitor progress of recommendations after one year					
8	Use the calibrated Yahara Lakes model currently under development to optimize management of Yahara Lake system and to achieve multipurpose objectives					
9	Promote and continue development of a river gauging network for the Yahara Lake system					
10	Install flow monitoring devices at Kegonsa Dam					
11	Monitor and evaluate the trends and use by various user groups					
12	Dane County, the DNR, and the USGS should continue the 2002 proposed monitoring of the Waubesa/Kegonsa/Yahara River channels and report back to our Yahara Lakes Advisory group with its findings					
13	Promote the development of an electronic lake management system, linking model data with real-time USGS flow and lake stage data provided daily					
14	Monitor spawning beds for water depth to let county and state staff know when high water is needed					
15	A continuous rainfall runoff model should be developed for the entire system. Rain gauges should be installed throughout the watershed that could be used as input to the operator of the model					
16	Implement demonstration practices that are equipped with monitoring capabilities so that their effectiveness can be assessed					
17	Develop a continuous hydraulic/hydrologic model of the watershed including the lakes and connecting channels that can account for present and potential land use conditions and land management practices in the watershed and the potential modification of control structures and channels					

No	Land Use	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	Require full infiltration from all new development either onsite or nearby. Be stormwater neutral (no runoff)					
2	Dane County and municipalities commit to long term goal of no net increase in the total volume of stormwater runoff					
3	County/city tax revenues be directed at establishing to full-time lake keepers to monitor and enforce stormwater ordinances					
4	Municipalities including cities, inventory, report on and institute possibilities for stormwater infiltration beyond that which is in place					
5	A standard watershed-wide legal ordinance be instituted to infiltrate runoff from impervious surfaces at a target level					
6	Low lying riparians be approached to obtain future easements fee ownership of their property in order to revert it to public ownership					
7	Offer voluntary matching money to elevate or buyout existing flooding homes					
8	Opportunities to significantly increase the infiltration of stormwater and snow melt into the groundwater should be identified and emphasized to all areas that significantly impact lake levels					
9	Encourage the use of rain gardens. Investigate how much they contribute to solving the problem.					
10	Commercial, industrial and residential development north of Lake Mendota, should if necessary, be restricted by zoning to minimize the impact of stormwater runoff caused by development into the Yahara Lake system					
11	Planning and new laws be introduced to reduce stormwater volumes delivered to the Yahara Lakes					
12	Create environmental TIF (tax incremental financing) districts					
13	Efforts may be made within public ownership along the lakefront to restore predevelopment vegetation communities and restore fish and wildlife habitat					
14	Control the inflow of fertilizer and waste products from surrounding farmlands into the Yahara system					
15	Develop upstream stormwater retention systems to hold back water from entering the downstream waterways					
16	Develop stricter regulations regarding “catch basins” and new developments to better control rate of water flow into the system and diminish odds of flooding					
17	Zoning regulations for building in the watershed should assess the impacts on the lakes as well as on land. All stakeholders benefits need to outweigh the individual’s advantage					
18	New developments within the basin should be designed to reduce flood flows or at the very least, not increase downstream discharge					
19	Stop the draining of wetlands for either farming or development					
20	Ensure new developments adhere to current standards of control to prevent sediment and erosion into the system					
21	Strengthen county stormwater ordinance to control floodwater from the real 100-year rain event using current rainfall information					

22	Restore wetlands to improve lake quality and natural habitat					
23	Restore drained wetlands in the Lake Mendota Basin to store flood water and reduce pollution with a goal of restoring 20-30,000 acres.					
24	Develop a county internal consolidation between Land Conservation Department, Lakes and Watershed Commission and Parks Department					
25	Add and expand stormwater detention capacity in existing communities to reduce flood runoff					
26	Setup a purchase and/or transfer development rights program to reduce the development footprint north of the lakes in high flood areas					
27	Update the 100-year flood maps and end new building in 100-year floodplain area					
28	In developing lake level orders consider the aesthetic effects of proposals as well as the interests of individual stakeholders and ecological health					
<b>No</b>	<b>Education</b>	<b>Strongly Agree 2</b>	<b>Agree 1</b>	<b>Neutral /Abstain 0</b>	<b>Disagree -1</b>	<b>Strongly Disagree -2</b>
1	Establish criteria for determining feasibility and practicality of solutions					
2	A small percentage of “lake tax” be applied to all watershed residents as a foundation to fund lake restoration and improvement work					
3	Increase awareness of lake and watershed issues among the general public					
4	Residents and businesses that are located in high flood-prone areas should be notified each year of continuing trends of rising lake levels that jeopardize the continued existence of their structures. There should be no surprises if flooding occurs					
5	Enforce littering rules/laws by boat ramps, bridges, and fishing spots. Serve fines and use money for cleanup					
6	A well-planned effort should be made to communicate all key recommendations to officials in the general public via e-mail, brochures, newsletter and other publicity					
7	A communication and education director should be appointed to promote understanding of the lake level issues and coordinate citizen efforts to maintain healthy lake levels and prevent flooding					
8	Recommend a public education by an ongoing result of our meetings, such as using a floating classroom, materials available to the public schools					
9	Engage the development in real estate industry to be involved in implementing best practices in water, lake, land management					
10	Continue the Yahara Lakes website and promote its usefulness to the general public					
11	Dane County Public Works should have a web page that displays the current operating status of all the dams on the river					



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## **Yahara Lakes Advisory Group**

### **Meeting Agenda: May 22, 2002 (6:00 pm) Dane County Public Works Administration Building**

1. Amendment and Approval of Minutes of April 29, 2002 and May 13, 2002.
2. Announcements.
3. Review communication guidelines.
4. Review recommendation evaluation criteria and decision-making processes.
5. Discuss and vote on proposed recommendations.
6. Next steps and possible future meeting date.
7. Public Comment.

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*University of Wisconsin-Extension, U.S. Department of Agriculture and Wisconsin counties cooperating. UW-Extension provides equal opportunities in employment and programming, including Title IX and ADA. To ensure equal access, please make requests for reasonable accommodations as soon as possible prior to the scheduled program. Call (608)224-3718 to request an accommodation.*

**Yahara Lakes Advisory Group  
Meeting Minutes May 22, 2002 6:00 p.m.**

**Attendees**

Margaret Andreasen	Eileen Bruskwewitz	John P. Dunn	Bill Fitzpatrick	Don Hammes
Greg Friis	Ken Johnson	Dick Lathrop	Ken Potter	Aicardo Roa
John Van Dinter	Kurt Welke	Jan Zimmermann	Ray Potempa	
Facilitator - Mindy Habecker	Recorder - Sue Josheff			

1. Approved May 13, 2002 meeting minutes
2. Announcements:
  - Tuesday, June 25, 10:00am canoe trip (June 26 rain date). Will put in at McFarland locks with lunch at Fish Camp. Arranged by Marcia Hartwig, Dane Co. LCD and Dick Lathrop. Signup sheet went around. Contact Marcia (224-3730) if interested.
  - Outreach Kickoff Event: June 12, 6:00pm-9:00pm at Olbrich Gardens. Kurt Welke had a copy of the draft brochure which will be edited and should be printed soon.
3. Communication Guidelines
  - Limit discussion to 5 minutes for each recommendation
  - Need to get through all remaining recommendations
4. Two hand outs
  - Ken LePine, Dane County Parks Directors sent the group a letter and a copy of the Lower Mud Lake Resource Protection Plan. The Plan discourages dredging in the Lower Mud Lake which Mr. LePine believes is in conflict with Recommendation # 4. The group however does not believe Recommendation # 4 is anything other than an evaluation and is not a recommendation to dredge at this time.
  - Informational paper on ice expansion by Ken Kosick, P.E.
5. Next meeting - Wednesday, May 29 4-6:30 pm at the Dane County Public Works building

Below is the revised chart of recommendations. The color and symbol codes are as follows:

- a. Parts in **red** and underlined are new parts or changes, etc.
- b. All underlined parts are new or changes (for those printing in black and white).
- c. Parts eliminated are shown in ~~strikethrough~~.
- d. All references to "the system," "the lake system", "the Yahara Lakes System," "the Yahara River and Lakes system," "the river system" and "the Madison chain of lakes" were changed to be consistent with "the Yahara River system."

## Yahara Lakes Advisory Group Proposed Recommendations

No	Lakes Management & Operations	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	All control structures from Lake Mendota to below the Stebbinsville Dam be unified under a coordinated and recordable management strategy based on a Yahara River System management plan to be developed which would be able to articulate responses to various scenarios such as development of the basin.					
2	Yahara base flows be maintained at a level where no or extreme or low flow scenarios are avoided					
3	Establish a process to repair or compensate riparian property damaged by flooding					
4	Evaluate methods such as modification of bridge constrictions, aquatic plant modification, dredging, channel modification, etc. to increase flow conveyance. <del>and make recommendations where cost effective.</del>					
5	Operations rules for the lakes must provide for stable and predictable lake levels that are protective of public and private properties, wetland, shorelines, fisheries, water quality and recreational users.					
6	Change the summer minimum <u>of Lake Mendota</u> from 849.6 to 849.1 to allow for greater possible flood storage.					
7	Consider using highly treated wastewater effluent to restore the water balance in the Yahara River system					
<del>9</del> 8	Design orders to address all four seasons, not just summer maximum and winter minimum					
<del>12</del> 9	Develop lake and shoreline regulations affecting all riparians, both public and private, in a uniform way					
<del>13</del> 10	The DNR orders should contain flexibility to given water levels since the Yahara Lakes historically have been operated outside of the current borders.					
<del>15</del> 11	<del>Recommend that w</del> Winter minimum lake levels <u>should</u> be kept at the upper level of their range (highest elevation) especially for the period from March 1 <sup>st</sup> on					
<del>16</del> 12	Establish a structure and process for planning and funding capital improvement and maintenance of flood control and navigation structures on the Yahara River system (i.e. locks, dams, conveyance channels)					
<del>17</del> 13	Establish specific processes for responding to flooding that set specific standards for use restriction on recreational users necessary to protect property and the environment					
<del>20</del> 14	Maintain the lake levels at or below the ordinary high water mark during the summer months					
<del>21</del> 15	Consider property values and uses in adjusting lake levels.					
<del>24</del> 16	A flood management plan shall be developed with shoreline protection elevations					
<del>28</del> 17	Establish <del>a</del> <u>standing</u> quick response teams <u>in flood prone areas</u> comprised of local and county officials <u>which will work with county emergency response officials</u> to prepare and respond to flood conditions. The teams <u>s</u> hould be assembled when the static lake level exceeds <u>s</u> the OHWM on any of the lakes.					
<del>29</del> 18	Examine the feasibility of adding additional flood protection and flood proofing on Lake Monona					
<del>31</del> 19	<u>Dane County Public Works and DNR fisheries should coordinate</u> <del>L</del> lake levels in the Yahara River system and particularly Lake Mendota must remain high enough from March 15 to mid-May to allow fish to spawn, young fry to grow to sufficient size to survive once water levels are lowered.					

<del>32</del> 20	Do not begin to draw down the level of Lake Mendota until October 30 in order to retain safe passage of boats and get all those on and off the lifts on all lakes.					
<del>34</del> 21	Reevaluate user fees to fund the operations and maintenance of boat launch facilities and locks					
<del>35</del> 22	When the level of Lake Mendota rises above the OHWM (850.7 MSL)* a state of high flow shall be declared. This state of high flow will remain in effect until all the lakes in the chain are at or below their maximum summer operating level. A declared state of high flow will result in 1. The Babcock and LaFollette Dams discharging under free flow conditions (without stoplogs) and the Stoughton Dam increasing discharge in order to maximize discharge at LaFollette. During this period of declared high flow the Stoughton dam's minimum operating level will not apply. The discharge of the Stoughton dam will be increased until the flow at the LaFollette dam is unaffected by downstream conditions (or until some upstream restriction becomes apparent). 2. Discharge of the Tenney Park Dam will consider flow conditions at the LaFollette Dam and will be operated in order to maximize discharge (downstream channel bank full) at the lock but not exacerbate flooding on the downstream lakes as long as dam conditions at Tenney are deemed safe (2000 flood levels minus six inches*). When levels of Lake Mendota approach unsafe conditions the gate setting at the Tenny Dam shall be increased to prohibit any increasing in the lake level of Lake Mendota. <u>*recommended levels to be reviewed and finalized later based on further studies and public and expert input</u>					
<del>36</del> -23	Operate dams to mimic natural river flows.					
<del>37</del> 24	Evaluate the need to renovate Tenny, Babcock and LaFollette Lock and dams. The evaluation should include the possibility of automating the gates at one or all of the dams.					
<b>No</b>	<b>Monitoring/Modeling</b>	<b>Strongly Agree</b> <b>2</b>	<b>Agree</b> <b>1</b>	<b>Neutral /Abstain</b> <b>0</b>	<b>Disagree</b> <b>-1</b>	<b>Strongly Disagree</b> <b>-2</b>
<del>2</del> 1	Maintain an active monitoring program on the lower Yahara River to obtain accurate data <u>on channel hydraulics.</u>					
<del>7</del> 2	Reconvene Yahara Lakes Advisory group or modified group to evaluate and act on the flow measurements, data, provide education, and monitor progress of recommendations after one year					
<del>8</del> 3	Use the calibrated <u>USGS</u> Yahara Lakes model currently under development to optimize management of Yahara Lake system and to achieve multipurpose objectives					
<del>9</del> 4	Promote and continue development of a <u>state-of-the-art hydrologic monitoring river gauging network (ie. rain gages, lake level recorders, river flow gages)</u> for the Yahara <del>Lake</del> River system					
<del>11</del> 5	<del>Monitor</del> <u>Survey</u> and evaluate the <u>recreational trends, and uses, and economic impacts</u> by various user groups <u>of the Yahara River System.</u>					
<del>17</del> 6	<u>Promptly develop and apply</u> a continuous hydraulic/hydrologic/ <u>water quality</u> model of the watershed including the lakes and connecting channels that can account for present and potential land use conditions and land management practices in the watershed and the potential modification of control structures and channels					



No	Land Use	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
<del>3</del> 1	<del>Municipal and State County/city tax revenues be directed at establishing <u>to two</u> full-time lake keepers</del> <u>storm water dedicated inspectors</u> to monitor and enforce stormwater ordinances					
<del>5</del> 2	A standard watershed-wide legal ordinance be instituted to infiltrate runoff from impervious surfaces at a target level					
<del>6</del> 3	Low lying riparians be <u>invited</u> <del>approached to obtain future easements fee</del> <u>voluntarily provide right-of-first-refusal for future</u> ownership of their property in order to revert it to public ownership					
<del>7</del> 4	Offer voluntary matching money to elevate or buyout existing flooding homes					
<del>8</del> 5	Opportunities to significantly increase the infiltration of stormwater and snow melt into the groundwater should be identified and emphasized to all areas that significantly impact lake levels					
<del>10</del> 6	Commercial, industrial and residential development north of Lake Mendota, should if necessary, be restricted by zoning to minimize the impact of stormwater runoff caused by development into the Yahara River system					
<del>11</del> 7	Planning and new laws be introduced to reduce stormwater volumes delivered to the Yahara River system					
<del>13</del> 8	<u>Where possible we should encourage reestablishment of natural vegetation</u> <del>Efforts may be made within public ownership</del> along <u>public (and private?) the lake frontage</u> <del>to restore predevelopment vegetation communities and restore fish and wildlife habitat</del>					
<del>14</del> 9	Control the inflow of <u>sediment, animal waste, pesticides, fertilizer and other pollutants</u> <del>waste products from surrounding farmlands</del> into the Yahara River system					
<del>19</del> 10	Stop the draining of wetlands for either farming <del>or</del> <u>and possible future</u> development <u>within the Yahara River System.</u>					
<del>20</del> 11	Ensure new developments adhere to current standards of control to prevent sediment and erosion into the <u>Yahara River</u> system					
<del>21</del> 12	Strengthen county stormwater ordinance to control floodwater from the real 100-year rain event using current rainfall information					
<del>22</del> 13	<u>Preserve and R</u> estore wetlands to improve lake quality, <del>and</del> <u>natural habitat, and flood storage within the Yahara River System.</u>					
<del>23</del> 14	Restore drained wetlands in the Lake Mendota Basin to store flood water and reduce pollution with a goal of restoring <u>at a minimum 20-30,000 (31.25 square miles) acres by 2012.</u>					
<del>24</del> 15	Develop <u>better</u> <del>a</del> county internal <del>consolidation</del> <u>coordination</u> between Land Conservation Department, Lakes and Watershed Commission and Parks Department					
<del>25</del> 16	Add and expand stormwater detention capacity in existing communities to reduce flood runoff					
<del>26</del> 17	Setup a purchase and/or transfer development rights program to reduce the <u>future</u> development footprint north of the lakes in <del>high flood areas</del> <u>the entire floodplain.</u>					
<del>27</del> 18	Update the 100-year flood maps and end new building in 100-year floodplain area					
<del>28</del> 19	In developing lake level orders consider the aesthetic effects of proposals as well as the interests of individual stakeholders and ecological health					
20	<u>Identify and target sites for wetland restoration that offer the greatest promise for preventing future increases in flooding in the Yahara lakes.</u>					

No	Education	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	Establish criteria for determining feasibility and practicality of solutions					
2	A small percentage of “lake tax” be applied to all watershed residents as a foundation to fund lake restoration and improvement work					
3	Increase awareness of lake and watershed issues among the general public					
4	Residents and businesses that are located in high flood-prone areas should be notified each year of continuing trends of rising lake levels that jeopardize the continued existence of their structures. There should be no surprises if flooding occurs					
5	Enforce littering rules/laws by boat ramps, bridges, and fishing spots. Serve fines and use money for cleanup					
6	A well-planned effort should be made to communicate all key recommendations to officials in the general public via e-mail, brochures, newsletter and other publicity					
7	A communication and education director should be appointed to promote understanding of the lake level issues and coordinate citizen efforts to maintain healthy lake levels and prevent flooding					
8	Recommend a public education by an ongoing result of our meetings, such as using a floating classroom, materials available to the public schools					
9	Engage the development in real estate industry to be involved in implementing best practices in water, lake, land management					
10	Continue the Yahara Lakes website and promote its usefulness to the general public					
11	Dane County Public Works should have a web page that displays the current operating status of all the dams on the river					
<del>16</del> 12	Implement demonstration practices ( <u>ie. Rain gardens, shoreline habitat, stormwater detention, aquatic vegetation control</u> ) that are equipped with monitoring capabilities so that their effectiveness can be assessed <u>and evaluate their effectiveness.</u>					



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**Cooperative Extension**

<http://www.uwex.edu/ces/cty/dane>

## **Yahara Lakes Advisory Group**

### **Meeting Agenda: May 29, 2002 (4-6:30 pm) Dane County Public Works Administration Building**

1. Amendment and Approval of Minutes of May 22, 2002.
2. Announcements.
3. Review communication guidelines.
4. Review recommendation evaluation criteria and decision-making processes.
5. Discuss and vote on proposed recommendations.
6. Next steps and possible future meeting date.
7. Public Comment.

#### **Directions to the Public Works Administration Building:**

This building is part of the Alliant Energy Expo Center Complex. Take Rimrock Road entrance to the Expo Center off the Beltline. Drive straight back to the last building on the left (it is a dark brick one story structure). If there is a paid parking event going on during this or any subsequent meeting we have scheduled there, tell the gate keepers that you are here for a government meeting at the Public Works Building. They will not charge you a parking fee.

**Yahara Lakes Advisory Group  
Meeting Minutes May 29, 2002 4:00 p.m.**

**Attendees**

Margaret Andreasen	Eileen Bruskwewitz	John P. Dunn
Bill Fitzpatrick	Don Hammes	Greg Fries
Ken Johnson	Aicardo Roa	John Van Dinter
Kurt Welke	Ray Potempa	Sue Jones
Mike Kakuska	Brett Hulsey	Dave Taylor
Facilitator - Mindy Habecker	Recorder – Cami Peterson	

1. Meeting minutes from May 22, 2002. Corrections: Sue Jones and Greg Fries were in attendance in that meeting. Minutes approved.
2. Announcements:
  - Margaret needs a short bio from the speakers of the June 12 meeting at Olbrich Gardens.
  - Kurt will send out copies of the brochure for the June 12 meeting. The brochure will be sent to 1796 riparian owners on the 5 lakes and river. It will also be put on the Sustain Dane listserv, sent to all DNR outlets (newspapers, etc.) Feel free to send to other web sites, listserves, etc.
3. Mindy reviewed the communications guidelines
4. New recommendations? Ken Potter was going to rework some, but he was not present and did not send any changes in.
5. Voting process:
  - A clean copy of the recommendations will be sent out separately to members eligible to vote. Any member who attended 2 or more meetings since December 17 is eligible to vote and must vote for every proposed recommendation.
  - Deadline to send votes is June 5, 2002 at midnight. Send your votes electronically to Ken Johnson.
  - The votes will be tallied and the numbers will be totaled. Recommendations will advance if it has a 2/3 positive vote. Please note that a 0 (neutral) vote is a negative vote.
6. Next steps:
  - Habecker will draft a final report with an executive summary.
  - Meeting scheduled to discuss next steps to be taken after the voting results: **July 17 (Wednesday), 4:00 pm at Aicardo Roa's house, 1628 Waunona Way, Monona**

Below is the revised chart of recommendations. A separate copy with the strikeouts and red text removed will be sent to the members of the task force to use as their official ballot for voting.

## Yahara Lakes Advisory Group Proposed Recommendations

No	Lakes Management & Operations	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
1	All control structures from Lake Mendota to below the Stebbinsville Dam be unified under a coordinated and recordable management strategy based on a Yahara River System management plan to be developed which would be able to articulate responses to various scenarios such as development of the basin.					
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3	Establish a process to repair or compensate riparian property damaged by flooding					
4	Evaluate methods such as modification of bridge constrictions, aquatic plant modification, dredging, channel modification, etc. to increase flow conveyance. <u>and make recommendations where cost effective.</u>					
5	Operations rules for the lakes must provide for stable and predictable lake levels that are protective of public and private properties, wetland, shorelines, fisheries, water quality and recreational users.					
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7	Consider using highly treated wastewater effluent to restore the water balance in the Yahara River system					
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<del>13</del> 10	The DNR orders should contain flexibility to given water levels since the Yahara Lakes historically have been operated outside of the current borders.					
<del>15</del> 11	<del>Recommend that w</del> Winter minimum lake levels <u>should</u> be kept at the upper level of their range (highest elevation) especially for the period from March 1 <sup>st</sup> on					
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<del>29</del> 18	Examine the feasibility of adding additional flood protection and flood proofing on Lake Monona					

<del>31</del> 19	<u>Dane County Public Works and DNR fisheries should coordinate Lake</u> levels in the Yahara River system and particularly Lake Mendota must remain high enough from March 15 to mid-May to allow fish to spawn, young fry to grow to sufficient size to survive once water levels are lowered.					
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<del>37</del> 24	Evaluate the need to renovate Tenny, Babcock and LaFollette Lock and dams. The evaluation should include the possibility of automating the gates at one or all of the dams.					
<b>No</b>	<b>Monitoring/Modeling</b>	<b>Strongly Agree</b> <b>2</b>	<b>Agree</b> <b>1</b>	<b>Neutral /Abstain</b> <b>0</b>	<b>Disagree</b> <b>-1</b>	<b>Strongly Disagree</b> <b>-2</b>
<del>2</del> 1	Maintain an active monitoring program on the lower Yahara River to obtain accurate data <u>on channel hydraulics.</u>					
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<del>9</del> 4	Promote and continue development of a <u>state-of-the-art hydrologic monitoring river gauging network (ie. rain gages, lake level recorders, river flow gages)</u> for the Yahara <del>Lake</del> River system					
<del>11</del> 5	<del>Monitor</del> <u>Survey</u> and evaluate the <u>recreational trends, and uses, and economic impacts</u> by various user groups <u>of the Yahara River System.</u>					
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No	Land Use	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
<del>3</del> 1	<del>Municipal and State County/city tax revenues be directed at establishing <u>to two</u> full-time lake keepers</del> <u>storm water dedicated inspectors</u> to monitor and enforce stormwater ordinances					
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<del>8</del> 5	Opportunities to significantly increase the infiltration of stormwater and snow melt into the groundwater should be identified and emphasized to all areas that significantly impact lake levels					
<del>10</del> 6	Commercial, industrial and residential development north of Lake Mendota, should if necessary, be restricted by zoning to minimize the impact of stormwater runoff caused by development into the Yahara River system					
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<del>28</del> 19	In developing lake level orders consider the aesthetic effects of proposals as well as the interests of individual stakeholders and ecological health					
<del>20</del>	<u>Identify and target sites for wetland restoration that offer the greatest promise for preventing future increases in flooding in the Yahara lakes.</u>					

No	<b>Education <u>and Other Efforts</u></b>	Strongly Agree 2	Agree 1	Neutral /Abstain 0	Disagree -1	Strongly Disagree -2
-1	<del>Establish criteria for determining feasibility and practicality of solutions</del>					
-2 <u>1</u>	A small percentage of “lake tax” be applied to all watershed residents as a foundation <u>Create an account and increase support</u> to fund <u>watershed</u> lake restoration and improvement work					
<u>3</u> <del>2</del>	<u>Create educational programs focusing on</u> increasing awareness of lake and watershed issues among the general public					
<u>4</u> <del>3</del>	Residents and businesses that are located in high flood-prone areas should be notified each year of continuing trends of rising <u>river and</u> lake levels <del>that jeopardize the continued existence of their structures. There should be no surprises if flooding occurs</del>					
<u>5</u> <del>4</del>	Enforce littering rules/laws by boat ramps, bridges, and fishing spots. Serve fines and use money for cleanup					
<u>6</u> <del>5</del>	<del>A well planned effort should be made to</del> Communicate all key recommendations to officials in <u>and</u> the general public via e-mail, brochures, newsletter and other <del>publicity</del> <u>educational efforts</u>					
<u>7</u> <del>6</del>	<del>A communication and education director should be appointed</del> <u>Increase staff funding for the Lakes and Watershed Commission</u> to promote understanding of the lake level issues and coordinate citizen efforts to maintain healthy lake levels and prevent flooding					
8	<del>Recommend a public education by an ongoing result of our meetings, such as using a floating classroom, materials available to the public schools</del> <u>Combined with #6</u>					
<u>9</u> <del>7</del>	<del>Engage</del> <u>Encourage</u> the development and real estate industry to <u>go beyond minimum water quality best management practices</u> to be involved in implementing best practices in water, lake, land management					
<u>10</u> <del>8</del>	Continue the Yahara Lakes website and promote its usefulness to the general public <u>Investigate and implement more efficient public access to Yahara lakes information on the internet.</u>					
11	<del>Dane County Public Works should have a web page that displays the current operating status of all the dams on the river</del>					
<u>16</u> <del>9</del>	Implement demonstration practices ( <u>ie. Rain gardens, shoreline habitat, stormwater detention, aquatic vegetation control</u> ) that are equipped with monitoring capabilities so that their effectiveness can be assessed <u>and evaluate their effectiveness.</u>					





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## Yahara Lakes Advisory Group

### Meeting Agenda: July 17, 2002 (4-6:30 pm)

**Meeting will be held at Aicardo Roa's home located at  
1628 Waunona Way (on the southwestern side of Lake Monona)**

1. Announcements.
2. Review of June 25, 2002 field trip and July 10, 2002 Lakes and Watershed Commission discussion
3. Next steps for actions to be taken concerning the recommendations
  - What are the paths we choose to take? (What are some practical initiatives, programs, policies, or actions that we can suggest to address these recommendations? Where do we have leverage points or areas of influence and control?)
  - After all actions or sequences of actions record:
    - responsible party (who will steward these actions)
    - determine a timeframe
    - specify expected results and milestones
  - a. For key stakeholders regarding lakes management and operations, monitoring/modeling, land use and education and other efforts.
  - b. Budget/funding efforts
4. Public Comment.
5. Adjourn
6. Informal refreshments.

## Yahara Lakes Advisory Group Meeting Minutes July 17, 2002

The meeting began with Mindy handing out copies of the items that became recommendations and those that did not. Sue Jones also provided minutes from the 6/25 paddle trip.

A lengthy (and productive) dialog took place for the better part of an hour with the following main points surfacing:

- There is still some confusion as to the flow in the Yahara River versus the stage in Lake Waubesa. With little apparent vegetation to impede flow, the discharge under a similar lake stage on 6/25 was ½ of what it was earlier this year. The AVM will help clarify this but we also need to quantify the role of slope or “tilt” between Babcock and Lafollette dam to explain flow or lack thereof.
- The work thus far has been important and group needs to continue
- In order to maintain momentum, draw in partners, attract \$ , meet fiscal budget timelines, we need a few products RIGHT NOW. Expressed in several different ways, YLAG needs a “marketing issue”, “common theme,” “advocacy piece” or “poster child” to rally support for the entire package of recommendations. Whatever we do needs to be tangible and have results.

A. -To wit, it was resolved:

That for the IMMEDIATE NEED, YLAG will recommend to the Lakes and Watershed Commission that the USGS gauge at Hwy 113 and the AVM below Babcock Park on the Yahara River receive financial support for 2003-2004 to cover establishment, installation, continued operation of these 2 monitoring stations. We all agree that any comprehensive plan must be based upon a model supported by real data. Therefore, this modest request to establish and continue baseline-monitoring stations is consistent with the larger YLAG mission while serving as a necessary placeholder to keep the effort moving. Mike Kakuska and Ken Johnson shall provide John Dunn with the necessary costs and rationale which John will use to in his request before LWC. **This component will occur within the next week.**

Additionally:

- B. That 4 subcommittees be formed representing each of the categories we identified: Lake Management & Operation, Monitoring & Modeling, Land use, Outreach & Education. See last page for committee rosters. YLAG members who did not attend the 7/17 meeting are asked to sign on to any/all subcommittees they wish to serve upon. Individual subcommittee conveners (marked with a \* by their name) will schedule the individual meetings.
- C. That each Subcommittee would meet at least twice before the end of September to prioritize the recommendations within their respective category and develop an action plan for implementation following a template which Mindy will provide. The template will include statement of the problem, justification of the action, objectives, time frame, responsible parties, costs etc.
- D. We agreed we need a fall forum and that we need to get on this quickly – again, we need to keep the issues up front.

All participants enjoyed the generous hospitality of Aicardo and Sue at their comfortable lakeside home. The food was great, the drinks were cold, and the discussion lively. THANKS AICARDO !

Eileen “volunteered” her house for the next meeting of the whole in September. Mindy will coordinate a definite date.

## YLAG SUBCOMMITTEES

\*= convenes the group

### **Lake Management and Operation**

\* John Dunn  
Hank Simon  
Aicardo Roa  
Mike Kakuska  
Bill Fitzpatrick  
Ray Potempa  
Ken Johnson  
Kurt Welke

### **Monitoring/Modeling**

\*Aicardo Roa  
Dick Lathrop  
John van Dinter  
John Dunn  
Bill Fitzpatrick  
Ken Potter  
Mike Kakuska

### **Land Use**

(\* ) Convener ???  
John van Dinter  
Don Hammes  
Hank Simon  
Aicardo Roa  
Ken Potter  
Ken Johnson  
Sue Jones

### **Education/outreach**

\* Kurt Welke  
Eileen Bruscewitz  
Sue Jones  
Don Hammes

Respectfully submitted 7-18-02, KW  
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# **Appendix 5**

## **Presenter Handouts**

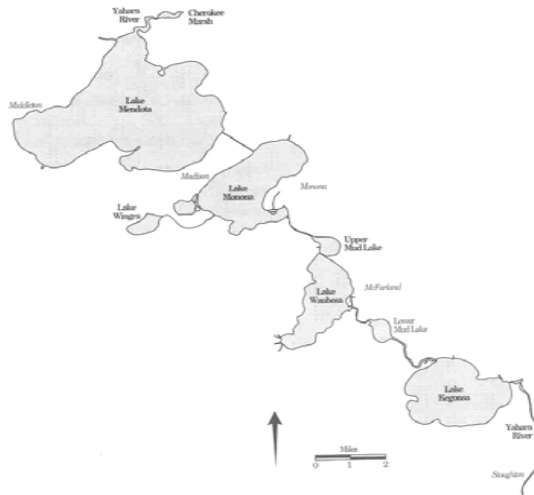
**(Available only from Mindy Habecker, Dane County UW-Extension  
Natural Resources/Community Development Educator, 608-224-3718)**

# **Appendix 6**

## **Public Forum Brochure**

# Yahara Lakes Advisory Group Forum

## *Findings & Recommendations*



**Wednesday, June 12, 2002**

**6 PM – 9 PM**

**Olbrich Botanical Gardens  
3330 Atwood Avenue  
Madison, WI**

**Free and Open to the Public**

## Yahara Lakes Advisory Group (YLAG)

Over the past decade, flooding along the Yahara River and Lake system has become more frequent and more damaging. To address this issue, Ken Johnson, Lower Rock River Water Leader, DNR, convened a group of key stakeholders to consider the DNR lake level operating orders, which were written over twenty years ago to determine if they were still effective for regulating and guiding the management of the water levels and flow through the Yahara system.

While lake levels prompted the initial discussion, it was clear that they could not be considered alone and the YLAG mission expanded to explore and evaluate the operations of the Yahara River and Lakes as an integrated system.

YLAG members represented a wide range of interests. Recognizing there were both conflicting and interests, YLAG members committed to fully participate in a process that would allow us to make educated, informed, and reasoned recommendations. After eight months of study the YLAG is pleased to offer its findings and recommendations to the public.

We invite you to attend if you:

- enjoy the Yahara River System
- want to understand the practical management of lake levels
- want to understand the science of our treasured water resources
- live along the Yahara waterways
- are an elected official in Dane County
- interested in the future of our watershed

Please join us.

Wisconsin Department of Natural Resources  
C/O Kenneth Johnson  
Lower Rock River Water Leader  
3911 Fish Hatchery Road  
Fitchburg, WI 53711

## Exhibitors

- WI Dept of Natural Resources
- Dane County Public Works Dept
- Dane County Land Conservation Dept
- Dane County Lakes & Watershed Commission
- Dane County Emergency Management
- Friends of Lake Kegonsa Society
- Madison Metropolitan Sewage District
- Friends of Lake Wingra

## Forum Sponsors

- WI Dept of Natural Resources
- Yahara Lakes Association Ltd.
- Dane County Lakes & Watershed Commission
- Clean Lakes Associates, LLC
- Skipper Bud's of Madison
- Eileen Bruskevitz, Dane County Supervisor, District 25



University of Wisconsin-Extension, U.S. Department of Agriculture and Wisconsin counties cooperating. UW-Extension provides equal opportunities in employment and programming, including Title IX and ADA. To ensure equal access, please make requests for reasonable accommodations as soon as possible (10 days is reasonable) prior to the scheduled program, service or activity. Call (608) 224-3718 to request an accommodation.

## Forum Agenda

6:00-6:30 **Interactive Displays & Refreshments**

6:30-7:00 **Introduction & Background of Yahara Lakes Advisory Group**  
Margaret Andreason, YLAG Member

Ken Johnson, DNR Lower Rock River Water Leader and Convener of YLAG

7:00-7:50 **Major Finding of Yahara Lakes Advisory Group**  
John Dunn, Dane Co Public Works

Ken Potter, UW Environmental Engineering

7:50-8:00 **Refreshment Break**

8:00-8:30 **YLAG Recommendations & Next Steps**

8:30-9:00 **Questions/Answers How to Get Involved Exhibits**

## Resource Web Sites

Dane County Lakes and Watershed Commission  
[www.co.dane.wi.us/commissions/lakes/home.htm](http://www.co.dane.wi.us/commissions/lakes/home.htm)

Dane County Public Works Department  
[www.co.dane.wi.us/pubworks/lakes/](http://www.co.dane.wi.us/pubworks/lakes/)

Wisconsin Department of Natural Resources  
[www.dnr.state.wi.us](http://www.dnr.state.wi.us)

## YLAG Members

- Margaret Andreassen, Village of Shorewood Hills, Village Trustee
- Eileen Bruskevitz, Dane County Supervisor District 25
- John Dunn, Dane County Public Works
- Bill Fitzpatrick, Yahara Lakes Association
- Don Hammes, Madison Fishing Expo
- Brett Hulsey, Dane County Supervisor, District 19
- Ken Johnson, Basin Team Supervisor, Lower Rock Basin - DNR Water Program
- Sue Jones, Dane County Lakes & Watershed Commission
- Mike Kakuska, Dane County Regional Planning Commission
- Dick Lathrop, UW Limnology/DNR
- Larry Nelson, City of Madison Engineer
- Don Peterson, Village of McFarland
- Mike Pinnow, Skipper Buds Marina
- Ray Potempa, Friends of Lake Kegonsa Society (FOLKS)
- Ken Potter, UW Engineering
- Dave Ritter, Dane County Sheriff's Department
- Aicardo Roa, Dane County Land Conservation
- Jon Schellpfeffer/Dave Taylor, Madison Metropolitan Sewerage District
- John Van Dinter, Chairman, Town of Westport and Lakes & Watershed Commissioner
- Kurt Welke, DNR Fisheries Biologist
- Jan Zimmermann, Lakes Waubesa Conservation Association

Mindy Habecker, Dane County UW-Extension Natural Resource/Community Development Educator, is the group's facilitator.

# **Appendix 7**

## **Action Planning Template & Committee Action Plans**



# **Yahara Lakes Advisory Group: Committee Action Planning Template**

**To be completed by: September 26, 2002**

## **Persuasive Analysis:**

- Describe the problem, need or opportunity these recommendations address.
- Provide evidence that this situation is of significant concern and worthy to move forward (Why is this important to do?)
- Present information that identifies the needs and existing strengths to deal with this situation.
- Distinguish your goals to address this.

## **Desired Outcome:**

- Identify what are the end results and effect of this effort
- Describe the anticipated changes due to this effort.

## **Implementation:**

- Identify the target audience(s).
- Describe the overall project strategy that includes the: how, what, when.
- Identify roles of key staff, stakeholders, collaborators, volunteers and others.
- Develop a time frame for the project implementation (a yearly or quarterly calendar format is often useful).
- Develop an estimate of the cost to complete project, and provide enough detail/justification to present to potential funders.

## **Resources:**

- Note what funding and other resources you will need for the project and where you hope to obtain them
- List what resources you will be developing by completing the project
- Identify what resources will be acquired for other sources (identify persons, if known)

## **Evaluation:**

- Describe your plan for evaluating your progress toward and achievement of outcomes
- Include a plan for reporting and communicating results.

Developed by Mindy Habecker, Dane County UW-Extension

# **LAKE MANAGEMENT AND OPERATIONS COMMITTEE ACTION PLAN**

The Lake Management and Operations Committee has completed the analysis of the YLAG recommendations and offers the following four action items for implementation.

## **ORDERS**

The committee recommends that the Department of Natural Resources issues a single, unified operating order for the entire system. This operating order should include flood triggers and fishery considerations. The Yahara Lakes Advisory Group shall support the DNR effort in issuing the new order, including advisory hearings and a letter of affirmation. The DNR will verify the legality of the order elements. The DNR will issue a new operating order.

## **FUNDING**

The committee recommends that funding alternatives be explored for the support of lake operations, maintenance of lake facilities (locks and dams) and engineering efforts. These alternatives would be the formation of a Lake District for the Yahara Chain, and/or the development of user fees. The lakes district would be formed from the 2240 riparian parcels in the system. The user fees would be developed for locks, boats, ramps and piers. The lake property associations in conjunction with the Lakes and Watershed Commission should lead this effort. The goal is to create adequate operations funds and a segregated maintenance fund.

## **RESTRICTIONS**

A system wide boating restrictions policy should be developed. During periods of high water and during special events (Rhythm and Booms, Ironman, etc.) there should be a standing no wake order that is keyed to the DNR operating orders. This effort should be supported by YLAG and developed by the Dane County Sheriffs Department with the cooperation of the Lakes and Watershed Commission.

## **SYSTEM FLOW**

The committee urges the continuation of the data collection effort initiated by the lower river task force. This effort will help determine where the best opportunities to increase flows exist in the Yahara River system. We urge YLAG, the Lakes and Watershed Commission and all riparian stakeholders to support this effort politically and financially. The goal is the permanent installation of an acoustic velocity meter at Babcock Park, and the annual recalibration of all staff gauges.

# **YAHARA LAKES ADVISORY GROUP: MONITORING AND MODELING RECOMMENDATIONS**

- 1. Maintain an active monitoring program on the lower Yahara River to obtain accurate data on channel hydraulics*
- 2. Reconvene Yahara Lakes Advisory Group or modified group to evaluate and act on the flow measurements, data, provide education, and monitor progress of recommendations after one year*
- 3. Use the calibrated USGS Yahara Lakes model currently under development to optimize management of Yahara Lake system and to achieve multipurpose objectives*
- 4. Promote and continue development of a state-of-the-art hydrologic monitoring network (ie. rain gages, lake level recorders, river flow gages) for the Yahara River system*
- 5. Survey and evaluate the recreational trends, uses and economic impacts by various user groups of the Yahara River System*
- 6. Promptly develop and apply a continuous hydraulic/hydrologic/water quality model of the watershed including the lakes and connecting channels that can account for present and potential land use conditions and land management practices in the watershed and the potential modification of control structures and channels*

## **Persuasive Analysis:**

The main problem that we face with the Yahara River system is the lack of flow information and a good understanding of how the system is affected by rainfall and increased of impervious area. This information is essential in knowing how to operate the dams that are affecting the elevation and the flow release of the system. A good example of the need to fully understand this information and the physics of how the watershed and dams relate flow and elevations is the recently proposed UW/MGE cogeneration facility. This project will affect both flows in the river and elevations of the lakes since it will remove 6 CFS of flow during peak demand periods, periods when we are likely to see low flows.

Accurate flow data is the starting point to understand the response of the Yahara Lake System to changes in the watershed. The Yahara Lakes Systems have very clear and distinctive responses to rainfall. Dane County has used Lake Mendota as a storage reservoir due to its large size and relatively stable lake levels when compared to flow. Lake Monona has an almost immediate response to the inflow from Lake Mendota due its relatively small size and flow constrains at the railroad bridge at Upper Mud Lake. Upper Mud Lake and Lake Wabesa are also affected by the rate at which water moves into the Yahara River channel through the Village of McFarland. Finally, the dams at Lafollette County Park and the Stoughton Dam affect the releases of the water from Lake Kegonsa.

Specific sites for future flow monitoring are: 1) the channel below the Tenny Park Dam 2) the Yahara River channel at the Village of McFarland below the Babcock Dam and 3) at the outlet of Lake Kegonsa below the dam.

Rainfall data is readily available around Dane County. This data can be easily incorporated into real time rainfall runoff model that helps managers of the dams make sound management decisions.

The management of the flow and elevation of the Yahara River system can be combined to provide benefits for fish management, aquatic sports and recreation and flood protection/relief.

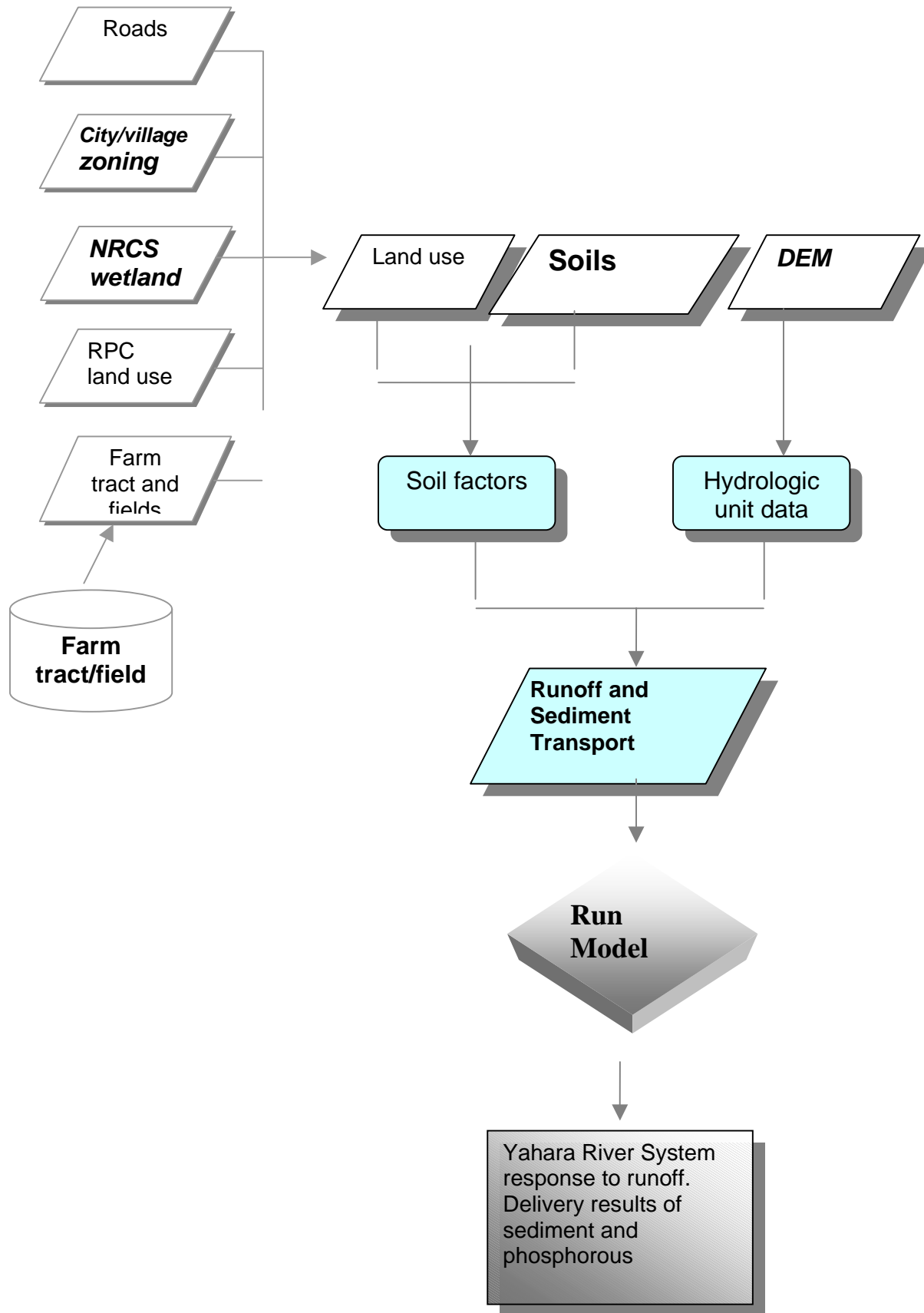
## **Modeling**

Develop a real-time Geographic Information System (GIS) database to provide soil, land use, crop management, topography and hydrologic information in the Yahara River Lake System; and use the factors as inputs into the model that incorporates water quality components. The model must have the capability to estimate the delivery of sediment and its attached phosphorus to receiving waters along the Yahara River Lake System. The water quality component of the model will be used as a tool to identify locations for rural and

urban BMPs that provide the most water quality and quality benefit across the Yahara River System. The water quantity component of the model will be used to manage lake and river levels and flows during high, low and normal conditions.

Geographic Information System (GIS) databases can be created using GIS software to create and combine digital land use/cover, soil and topographic factors. In the Yahara River System, many GIS data layers have been created and digitized, including farm tract and field boundaries, Dane County Regional Planning Commission (RPC) land use, NRCS wetlands, road centerlines, and soils. GIS based modeling can focus on creating a new land use layer from existing and new sources and a new surface drainage layer from a digital elevation model recently done by Dane County.

Much of the information for a new model already exists including digital soil information already from Dane County LCD. The Yahara River system has been divided in sub-watersheds. These sub-watersheds are further subdivided into drainage area units. Dane County's digital elevation model (DEM) interpolates a vertical elevation to the nearest foot for every 4 m on the ground.



Flow chart of the data inputs for running model

The data can be collected by USGS

Modeling and basic information: USGS, U.W., Dane County, DNR and NRCS

**Desired Outcome:**

The operators of the dams will make decisions based upon the monitoring and modeled data. Real-time data will be used to make the best possible decision on management of the Yahara system for all public interest and benefits. Communities will use this model to help make decisions during their planning process. Monitored data will be used to help establish the link between imperviousness and runoff responses to the lake and river. The model will help communities make informed decisions based on the impact of the proposed changes.

The use of this information will demonstrate the need to prevent runoff from leaving construction sites along with the need to infiltrate stormwater. The model will also demonstrate the impact of hydric soils and wetlands on flood prevention and groundwater recharge. Dane County will understand the importance of maintaining closed watersheds.

The data shall be collected year-round and put in the web site of the USGS, DNR and Dane County for general use and consultation.

**Implementation:**

A series of deliverables must first be developed. Preliminary cost estimates for the model and data requirements need to be understood. Once a ballpark product estimates are available, we need to seek financial support from agencies in the form of base level commitment and grant funding. After funding is secured, the project will be bid and developed. The logical home for the model would seem to be the dam operator, which is currently Dane County.

We will need to provide a standard power point presentation to be used by everyone interested in advancing the Yahara River flow monitoring and modeling system.

The key stakeholders, collaborators, volunteers and others are: USGS, U.W., Dane County, DNR, NRCS, citizens groups and lake associations.

The monitoring will be part of the effort to be founded by USGS, Dane County and DNR as part of the Lake Mendota Priority Watershed.

# **USGS Proposal for Modular Modeling System (MMS)**

**By**

**Peter Hughes**

**Supervisory Hydrologist USGS**

608/821-3833

[pehughes@usgs.gov](mailto:pehughes@usgs.gov)

Conceptually we are looking at a two-step approach where an initial rainfall/runoff screening model would be developed utilizing the USGS Modular Modeling System (MMS). The screening model would utilize larger hydrologic response units, probably one or two per basin, and would allow us to evaluate the following items:

- **What data are out there for the Yahara Lakes watershed?  
Will we need to collect more data?  
What model will be used? Will the USGS MMS provide the necessary results**
- **What storage is in the system and how much is known about it? Will we have to do much surveying to quantify the storage and channels?**
- **Check pluses and shortcomings with other large rainfall/runoff model projects (DuPage County?)**

These initial 20 to 40 days could be spent looking at the above and putting together a crude screening model (i.e. area of Pheasant Branch would be presented with two or four HRU's). These first efforts would let the modeler(s) know what they are up against.

## **Other questions that would need to be answered:**

**What questions do we have do address with the model?**

**Do we need a fine spatial scale to define infiltration areas? To determine what areas should not be developed? Do we need to do infiltration testing?**

**Do we want to model the effects of rain garden installations?**

**Does a module have to be written to incorporate dam gate settings and continuous lake levels?**

**Does the model need to include GW flow or ET from/into the lakes?**

**Do the Rock River backwater effects have to be accounted for?**

**Does the model have to simulate channel changes due to dredging as a solution to high lake levels?**

**Do we have to work on time steps of less than a day to prove that detention basins are not the answer for high lake levels?**

**Do we want to produce recharge input for the groundwater model?**

**Will it simulate future scenarios and what might these be (they will influence how the model is set up)?**

**What are the project products? Reports, fact sheets, presentations?**

The above would be a three to four month project with an estimated cost of \$25K. The USGS would match 50% of this cost. The scope of the comprehensive rainfall/runoff modeling would be determined from the answers to the above questions and we would be in a much better position to meet with the committee and discuss their needs and be able to provide realistic expectations for this modeling effort.

# **YAHARA LAKES ADVISORY GROUP COMMITTEE ACTION PLANNING LAND USE TEAM**

**1. A standard watershed-wide legal ordinance be instituted to infiltrate runoff from impervious surfaces at a target level.**

**3. Opportunities to significantly increase the infiltration of stormwater and snow melt into the groundwater should be identified and emphasized to all areas that significantly impact lake levels.**

**5. Planning and new laws be introduced to reduce stormwater volumes delivered to the Yahara River system.**

**Yahara River Persuasive Analysis:** Some of these recommendations are already being done. However, we need to improve. We know that we have systematically de-watered the Yahara (base flow) over the last 150 years; MMSD 42MGD diversion; increased impervious area; high capacity agricultural and urban well withdrawals. This situation has progressed to the point where we now know the Yahara River would run dry if it were not for the outflow of the Yahara Lake system. We also know that we have reversed the historical groundwater flow to the Lake Mendota to a point where we now discharge water from the lake rather than recharge Lake Mendota from ground water. Lastly, water that is infiltrated will not carry pollutants into the Yahara System's surface waters.

**Desired Outcome:** All towns, villages and cities within the Yahara River basin will adopt a performance standard within their ordinance's that requires 25% of all clean stormwater to be infiltrated. The ordinance will also preserve high infiltration areas and hydric soil areas for permanent infiltration.

Better awareness that infiltration is important and must be considered in new developments and re-developments.

**Implementation:** We need to develop a model ordinance and present it to all communities.

Outreach to communities, and especially friends groups, has to happen. Technical people from Dane County, DNR, UW, etc need to do presentations on water quality/quantity at every opportunity.

We need to develop a canned PP presentation that can be easily presented.

**Resources:** UW, DNR, City of Madison, DCRPC and Dane County staffs

**Evaluation:** The number of communities that adopt infiltration and water quantity control ordinances.



**2. Low-lying riparians be invited to voluntarily provide right-or-first-refusal for future ownership of their property in order to revert it to public ownership.**

**Persuasive Analysis:** Low-lying properties owners are the most likely to incur flood damage. Buying property once is always cheaper than continuing to pay flood damages.

**Desired Outcome:** State and municipal governments have first shot at buying these properties when they come up for sale.

**Implementation:** First, identify high-risk properties. Second, work with municipalities.

**Resources:** FEMA, Stewardship, Dane County Conservation, Dane County, DCNHF

**Evaluation:** Amount of flood prone property acquired

**4. Commercial, industrial and residential development north of Lake Mendota, should if necessary, be restricted by zoning to minimize the impact of stormwater runoff caused by development into the Yahara River system.**

**13. Setup a purchase and/or transfer development rights program to reduce the future development footprint north of the lakes in the entire flood plain.**

**Persuasive Analysis:** Developers left unregulated will develop all properties including environmentally sensitive areas, flood prone areas and areas that will result in high runoff.

**Desired Outcome:** All towns, villages and cities within the Yahara River basin will adopt zoning ordinances that restrict development in flood fringe areas, environmentally sensitive areas and areas that are capable of high infiltration. County, village, city and town governments will develop an acquisition program that helps to protect these areas.

**Implementation:** Done through county, village, city and town planning departments.

**Resources:** County, village, city and town governments; stewardship grants, TRM grants, NRCS programs

**6. Where possible we should encourage reestablishment of natural vegetation along public lake frontage.**

**Persuasive Analysis:** The public owns the largest percent of shoreline. Public property should be a positive example of good stewardship. Good stewardship should result in projects that promote water quality, natural scenic beauty and improved habitat.

**Desired Outcome:** Public lands are restored to natural and native habitats wherever practical.

**Implementation:** Work through agencies (campus natural areas, Dane County Parks, City Parks, DNR) to reestablish natural vegetation whenever practical. Present recommendations of this group to city, county and state park managers.

**Resources:** DNR, City of Madison, Dane County, towns and villages.

**Evaluation:** City, county and state government properties comply with local zoning and aggressively restore shorelines to native natural vegetation.

**7. Control the inflow of sediment, animal waste, pesticides, fertilizers and other pollutants into the Yahara River system.**

**9. Ensure new developments adhere to current standards of control to prevent sediment and erosion into the Yahara River system**

**Persuasive Analysis:** Sediment and animal waste can have a huge affect on the degree of eutrophication of our lakes and streams. Phosphorous is a limiting nutrient that controls plant growth. Control P and we can control the amount of nuisance plant growth (blue green algae and filamentous algae) in the lakes. While P comes from many sources construction sites contribute an inordinate amount of P. Animal waste sites contribute P that is readily bio available. The problem with P is not animal waste, fertilizers or construction sites but rather all three.

**Desired Outcome:** 50% reduced nutrient load to all lakes. Reduction in the amount of time we experience nuisance plant growth in our lakes and streams.

**Implementation:** New non-point rules, LCD, local public works and local zoning departments control this issue. Need to enforce the role of zoning inspectors.

**Evaluation:** Reduced P loads to all the lakes. Improved water clarity and quality.

**10. Strengthen county stormwater ordinance to control floodwater from the real 100-year rain event using current rainfall information**

**Persuasive Analysis:** There is a perception that hydrologic conditions have changed and that we now experience 100-year events on a routine basis. While this perception may or may not be accurate, developers, engineers and planners need to use the latest and best information to predict future flooding.

**Desired Outcome:** Hydrologist and engineers avail themselves of the best hydrologic data currently available.

**Implementation:** Need to use updated TP 40 for rainfall done in 1970.

**Resources:** UW, DNR, city engineering departments and Dane County

**Evaluation:** Ordinances reflect best available technology.

**8. Stop the draining of wetlands for either farming or possible future development within the Yahara River System.**

**11. Preserve and restore wetlands to improve lake quality, natural habitat, and flood storage within the Yahara River System.**

**15. Identify and target sites for wetland restoration that offer the greatest promise for preventing future increases in flooding in the Yahara lakes.**

**Persuasive Analysis:** Wetlands are key features on the landscape that contribute greatly to water quality. Internally drained areas are extremely important for control of floods and must be maintained. If not maintained we will see higher flood levels and lower water quality and in our lakes and streams.

**Desired Outcome:** Change municipal ordinances to require preservation of wetlands and internally drained areas. Some of the higher quality areas ought to be publicly acquired. Drainage of internally drained areas should be denied or permitted only with extensive stormwater (quantity) mitigation.

Local planning agencies are aware of the need to preserve these areas

**Implementation:** Technical people from Dane CO, DNR, UW, etc need to do presentations on water quality/quantity at every opportunity.

We need to develop a canned PP presentation that can be easily presented.

**12. Develop better county internal coordination between Land Conservation Department, Lakes and Watershed Commission and Parks Department.**

**Persuasive Analysis:** During flooding periods it essential that local governments coordinate their services to affected property owners.

**Desired Outcome:** The County LCD, Lakes and Watershed Commission and Parks Department review their plans to provide services to flood prone areas and coordinate their efforts to maximize services.

**Implementation:** County government is convening a task force to address coordination issuing during flood conditions.

**14. Update the 100-year flood maps and end new building in 100-year floodplain area.**

**Persuasive Analysis:** FEMA has also recognized the need to update Dane County's maps and is currently doing so. Developments in flood fringe areas result in lose of flood storage. Cumulative lose of flood storage will result in higher peak flood flows.

**Desired Outcome:** Rainfall run off model should be used. Local flood delineation maps are up to date and accurate. All city, village and county ordinances are changed to prohibit development in flood fringe areas.

**Implementation:** Update of maps is being done by FEMA. All city, village and county ordinances are changed to prohibit development in flood fringe areas.

**Resources:** FEMA grants

## YLAG OUTREACH COMMITTEE DRAFT ACTION PLAN

### Analysis/Strategy

Problems due to flooding on the Yahara Lakes will continue. Previous history and all analyses of development, rainfall and runoff agree that frequency and severity of water “volume problems” will continue to increase. Outreach efforts need to be directed towards multiple key publics such as local, county, and state government officials as well as the development community in order to get them to implement various YLAG recommendations to prevent flooding. **The implementation section below pertains to the Outreach Committees first task within a continuum of needed efforts. We fully intend to also address the final six recommendations (Table 1) of YLAG with directed efforts.**

### Implementation

The Outreach Committee realizes that we must have both short-term and long-term goals and objectives. *In the immediate future* Outreach will host an informational meeting focusing on “ **the state of things now.**” The idea is to build credibility for YLAG and its work by sponsoring a meeting that discusses the need and timeliness of the YLAG recommendations.

Our target audience will be:

1. Key local elected officials
2. Members of municipal planning commissions
3. Key “movers and shakers” w/in the development community
4. Principals in the realty community.
5. Attorneys specializing in land transaction and development
6. Department of Transportation officials involved with transportation in the Lake Mendota Watershed.

Outreach will develop an informative brochure to accompany an invitation to attend this forum.

The presentation will follow this outline (suggested presenters indicated):

- A. Development trends for the Yahara lakes from RPC (Mike Slaveny)
- B. Flooding forecast and causes...presenter YLAG members (Ken Potter)
- C. Vulnerable location – who is going to get wet (??)
- D. What can be done -YLAG recommendations (YLAG Outreach Members)

Outreach needs to

1. FIRM-UP DATE, TIME, LOCATION
2. DEVELOP THE BROCHURE AND INVITATION
3. DEVELOP INVITE LIST
4. OBTAIN PRESENTERS & COORDINATE THE MESSAGES
5. GET PRESS

# **Appendix 8**

## **Decision Making Process and Method for Recommendation Evaluation**

# Yahara Lakes Advisory Group

## Decision Making Process and Method for Recommendation Evaluation

### Decision Making Process

1. Try to achieve consensus (agreement in opinion). Recommendations with consensus move forward from the group.\*
2. Where consensus cannot be achieved, take a vote of the group present (if quorum). Decisions that receive at least a 2/3 positive vote of stakeholders present move forward as a recommendation; however, objections will be noted.
3. Where consensus cannot be achieved and the decision does not receive a 2/3 positive vote, the option will be stated with discussion noted.

### Method for Recommendation Evaluation

1. After generating and clarifying possible recommendations from the group, have group discuss each recommendation in turn and frame discussion around the following:
  - a. Can this be part of the best overall solution to the problem?
  - b. Will this recommendation satisfy the most people, be cost effective and practical (can be implemented), help produce a long-term solution)
  - c. Is it in the best interests of the larger community?
  - d. Does the recommendation need to be initiated right away?
  - e. Does it address the group's primary mission?
2. Discussion content will be noted in the report along with the deciding vote.

\*Levels of consensus: Once a recommendation is proposed, the group must discover how each member feels about it, and then identify specific concerns in order to move forward. There may be various levels of support for a proposed recommendation, from enthusiastic support, through luke-warm, to ambiguous support.

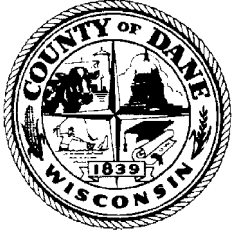
The framework that this group decided to use for decision making follows:

Level of Support	Points	Action
Strong support or agreement with the proposal	2	move forward
Agreement with most aspects of the proposal	1	move forward
Ambiguous feeling toward proposal. Feel neutral or wish to abstain from voting for our against	0	Neutral vote, no action
Disagree with most aspects of the proposed	-1	Does not move forward
Strong disagreement with the proposal (can't live with the proposal)	-2	does not move forward

Prepared by Mindy Habecker, Dane County UWEX

# **Appendix 9**

## **Handouts Presented by Stakeholders**



# DANE COUNTY

**Kathleen M. Falk**  
County Executive

November 26, 2001

Dear Members of the Yahara Lakes Advisory Group:

I am writing to let you know that Dane County fully supports the work that you are undertaking to evaluate a variety of issues regarding lake levels and flows for the Yahara Lakes. Dane County staff will continue to fully cooperate in this effort, and participate in your discussions and the development of recommendations.

The only reason that the county will not be officially co-sponsoring the Yahara Lakes Advisory Group is that the mission statement has now broadened beyond DNR's Yahara lake level orders and the county's management within those ordered levels. I was comfortable with co-sponsorship of such a tightly focused mission. If the county were to co-sponsor the meetings under the new expanded mission, I am concerned that it could possibly raise false expectations that the county would necessarily support all proposals that come from group deliberations, especially because some people are likely to propose costly solutions to the wide range of issues that you will now be addressing.

I will carefully review all county-related recommendations that come out of this group, and will expect that the Lakes and Watershed Commission and others will also review and advise on the recommendations. The county faces tight budgets, and cost will be a factor in county decisions about which recommendations to implement.

Please feel free to call on me and county staff for any support and assistance that will make your work more productive. Thank you for all the hard work that you are beginning on these tough issues.

Sincerely,

Kathleen M. Falk  
Dane County Executive



**6/25/02 Paddle Tour of the Yahara**  
**Wrap-up Observations and Conversations (on the grass at Potempa's)**

Stan Nichols (UW-Extension)

- Lakes Mendota, Monona, Waubesa and Kegonsa used to be part of one large Glacial Lake Yahara, and water levels have been dropping for 10,000 years since then.
- Dyreson area is illustrative of fact that Indian remnants are usually found within ¼ mile of water.
- We've lost 1/3 of the aquatic plant species from the Yahara Lakes in the last 100 years, and that's significant if we think of the lakes as a natural area.
- Big problem: invasion of exotics such as curly-leaf pondweed and Eurasian water milfoil. Hydrilla has good potential of being the next exotic aquatic plant invader, and it grows quickly, but with the strong interest in water gardening and back-yard ponds there is a plethora of potential that we aren't even thinking about that can be ordered through catalogs. A problem with hydrilla is that it looks very similar to the native waterweed (*Elodea canadensis*) so it could invade without being easily detected.
- Plants in the river (Mud plant, wild celery, pond weed) are adapted to floating water environments - they flow with the current.
- We observed an increase in water clarity below Lower Mud Lake, and that indicates that plants in Lower Mud are filtering water

John Dunn (Dane County Public Works)

- Staff gauges he pointed out during the paddle and the acoustic velocity meters (add specific locations here) allow measurements that are important for making wise decisions.
- The trip just taken suggests there's value in having trained docents available to interpret this and other trips - floating classrooms.

Stan Nichols and Dick Lathrop (DNR Research) - on practice of mechanical harvesters offloading plant piles along the river

- Plant loads are mostly water. Some nutrient leaks back to the water from plants as they decay, but the nutrient content is low. (Dick's comparison of P in plants v. P in water column)
- Advantage of many piles versus larger pile along the river? This is mostly an aesthetic issue.
- Machine operators should be trained not only how to operate machines, but also when and where to cut plants.
- Until study shows that plants are major constrictions on flow, more ecological damage is done than benefits of cutting

Peter Hughes (US Geological Survey)

- The only change in the channel seasonally is plant growth, and it does have a backwater effect.

Ray Potempa (Friends of Lake Kegonsa Society)

- Any lowering of water levels in Kegonsa to increase head and increase system flow will have an effect on riparians. On the east side of Kegonsa piers are already 100 feet long to reach any depth for launching.

Larry Nelson (City of Madison Engineering)

- Lake level orders haven't changed for years, but operation has changed over the last 15 years. The summer maximum is now treated as the minimum for Lake Mendota
- City of Madison houses were generally built on higher land and generally do not experience flood damage. The city does have problems with sanitary and stormwater. City of Monona homes have greater problems when built in low areas.
- Lake levels have been rising, and no one is taking responsibility for action. Not sure if it is practical to have upstream development alone incorporate new practices to infiltrate water.
- Surprised at how little data we have on quantity issues on these lakes.

John Magnuson (Prof. Emeritus, Center for Limnology; Lakes and Watershed Commission)

- Two things suggest worsening trends: first is higher percentage of imperviousness which is generating runoff. Older developments were not built for infiltrating water.
- Second is over the last 60-80 years we've seen a higher percentage of rain in extreme events. This leads to increased soil saturation and more runoff.
- Need to pay more attention to trapping water at the source.

Ken Potter (Prof. Civil and Environmental Engineering)

- Optimistic that can trap more water at the source and prevent more flooding
- Demonstrations are needed on different approaches
- Retrofits are harder due to land scarcity, but people are doing things regardless
- Already have flooding problems and need to look at all possible approaches to preventing future problems - and looking at the "plumbing" of the Yahara River

Brett Hulsey (Sierra Club, Lakes and Watershed Commission)

- Sierra Club has submitted grant application to McKnight Foundation for Don Hey to look at Yahara system
- Farm bill provides opportunities to get money for directing development in the northern part of the basin, preserving farmland, and implementing purchase of development rights strategies

Shary Bisgard (Lakes and Watershed Commission) asked for input on Commission direction on these issues. The following suggestions and observations were offered on next steps:

- Increase funding for studies and monitoring. County spends very little money on monitoring and it's been a fight during budget process for the last 12 years to maintain monitoring support (Lathrop)
- Commission has supported keeping monitoring in the budget. This is not a flashy item, and it's helpful to have outside interests come and testify; contribute to budget hearings and position/advocacy papers (Karen Cornwell and John Van Dinter)
- Commission should take lead in looking at info needs and other YLAG recommendations, put together a comprehensive package (not just individual gage requests) of budget needs for monitoring, modeling, and study, and advance this through the process (several)
- County budget is not only place to advocate. Proposal should be prepared to Sen. Kohl. Should identify items in the current federal budget that could be expanded and earmarked for conducting the modeling needed here, for example. This work would take more than a year to pay off if it is successful. (Brett Hulsey)
- USGS faces same pressure to cut monitoring every year, and that affects 50% match it can offer locals for monitoring (Peter Hughes)
- Could also request a mini study (6-8 months) to determine what modeling is really needed; then define data inputs and length of record needed (Peter Hughes)
- Really need overall hydrologic model of the watershed - sooner. Dane County ordinances regulate site development, and we also need to work regionally. We don't have a lot of time especially when we are rapidly developing. (Larry Nelson)
- Models should include alternative management practices. Could build on USGS work on the Pheasant Branch - agrees that we can't wait. We should be looking at having contracts for model preparation (watershed and hydraulic linked) in place within 6 months. Suggest parallel process used for development of Dane County Regional Hydrologic Study - oversight group, contributions from many participants. The effort we are talking about is as important as that. We need a model to grow with in the future. (Ken Potter)
- Need to engage development community in this. A short-term action for the Commission should be to co-sponsor a forum for developers to hear presentations by Potter and others so they have the background. Fall is a better time because active construction will slow down.

# Attachment 1

## Lakes and Watershed Commission 2003 Budget Recommendations

The Dane County Lakes and Watershed Commission's mission is to protect and improve water quality, as well as the scenic, economic, recreational and environmental value of Dane County's water resources. By state statute, the Commission annually reviews the water-related portions of the Dane County budget, and makes recommendations to the County Executive.

The Dane County Lakes and Watershed Commission's recommendations for the Dane County 2003 budget are the result of careful review of Departments' and Divisions' relevant budget items. As it has every year, the Commission focuses its recommendations on proposals for new county funding in the coming year. The Commission's review process resulted in a highest overall priority recommendation, as well as highly recommended, recommended, and not recommended, as detailed below.

The Dane County Lakes and Watershed Commission believes that the County Board and County Executive need to recognize that in order to have the effective conservation and environmental protection programs that are needed, the county budget must include adequate funding and staffing for them. If there are no longer grants or other funds to carry out important environmental work, and with likely state funding cuts, the General Fund must pick up the cost, even if that might require an increase in the property tax rate.

**[NOTE: The following recommendations are not in priority order within categories.]**

### HIGHEST OVERALL PRIORITY

**\$20,500 to install and operate an acoustic velocity meter on the Yahara River.** Although the Public Works Department did not submit this request, this funding is essential to gathering data for monitoring or modeling to make better decisions about improving the flow and reducing flooding in the Yahara River system. The Yahara Lakes Advisory Group found a lack of good information on the quantity and quality of flow in the Yahara River, and for that reason, placed a premium on obtaining good base level information. One of the most difficult parts of the river/lake system to understand is the stretch of water between the Babcock Dam and Lake Kegonsa. While there is an existing gage at Babcock Dam, it is based on old technology that makes any real time use of the data impossible. In addition, the acoustic velocity meter will document flow response to weed control in the river and this information can then be used for future weed control management decisions. The requested \$20,500 includes \$6,000 for ongoing operations, which should be included in the base budget for 2004 and subsequent years. The U.S. Geological Survey has loaned Dane County an acoustic velocity meter temporarily, but will remove it in the near future unless the County picks up the cost.

This meter will help provide preliminary information for the more complex model, another Yahara Lakes Advisory Group recommendation, likely to be proposed for inclusion into the county's 2004 budget.

**Aquatic plant harvesting.** The Lakes and Watershed Commission continues to be concerned about the efficiency and effectiveness of the existing aquatic plant cutting operation. The Commission would like to see a thorough review of staffing and training of weed harvester staff, and the existing aquatic plant management plans for the lakes and how they are being followed. A long-term strategy for reducing weed growth (e.g. eliminating uncontrolled stormwater discharges) is also needed.

A recent program evaluation by county board staff raised a number of questions and concerns regarding the county's aquatic plant harvesting program the Commission believes must be addressed. See Attachment 3. To date, there has been only a cursory response. The Public Works Department should address these issues more completely no later than December of this year so positive changes can be instigated for the 2003 aquatic plant harvesting program. We recommend that before any 2003 funds for lake-related activities are released, the

Commission and the Public Works committee approve an aquatic plant management plan that adequately addresses weed harvesting in the lakes and Yahara River.

**If these issues are addressed, the Commission recommends \$30,000 for Public Works to increase staffing for aquatic plant harvesting** so that crews can operate from sunrise to sunset, thereby more efficiently using the harvesting equipment. This was not requested by the Public Works Department, but continues to be recommended by the Commission for the second year in a row. Current staff is not able to keep up with the demand. A second LTE crew, given the widespread need to control flooding and increase recreational enjoyment, is important to deploy. We have a widely visible proliferation of weeds in the lakes and river and this problem badly needs to be addressed.

**\$36,000 for Sheriff's airboat replacement.** The current airboat is a 1982 Panther with a 350-hp motor, which has proved its value for both rescue and body recovery. The boat is undependable and not worth repairing. Technology has been greatly improved in the development of safer and more efficient ice rescue boats. The proposed airboat is multi-use, as it can be used on both ice in the winter and water in the summer. This is the only boat the Sheriff has that can be used for ice and cold water rescue and the only boat at their disposal that can be utilized in some areas of the Wisconsin River.

The Sheriff's Office is in the process of appealing the DNR's current position not to provide reimbursement for this type of boat and, if successful, will receive up to 75% reimbursement. If DNR refuses reimbursement, the Commission recommends the patrol boat receive funding instead of the airboat.

**Additional half time Commission staff.** See Attachment 4 for justification.

### **HIGHLY RECOMMENDED**

**\$37,500 for Sheriff's scheduled replacement of boat #1.** The patrol boat to be replaced is a 1998 19' catamaran with a 150 hp outboard engine. The boat was originally designed for twin 75 hp engines. Placement of the engine in the center of the transom has caused performance and fuel consumption problems. Water is able to get inside the hull and will eventually rot the transom. The new engine will be a more environmentally friendly and fuel-efficient four-stroke engine.

The cost of the boat recommended for replacement is \$37,500, with a net cost in 2003 of \$6,651.18 (reflecting DNR reimbursement expected in 2003).

In addition to the cost reimbursement above, in 2003 the first boat in the series could be turned over to another department for one year. This removes the boat from the state reimbursement schedule. After remaining out of the Sheriff's Department inventory for one year, it could be sold for at least 25% of its new value. This income (75% reimbursement plus sale of the boat in year seven) would result in a net cost to the county of \$0.00 for the boat that was purchased five years ago.

Using the same logic described above, in six years the new boat will have a net cost of \$0.00. If the boat is not purchased this year, the reimbursement schedule no longer works and the boats again begin to cost the county a significant amount of money.

This is a continuation of the boat replacement schedule initiated in 1998 (Attachment 5 is the Sheriff's Department description of actual costs and revenues to date). In the long-term, this results in a new patrol boat each year for only \$7,500. The Department of Natural Resources reimburses up to 75% of the cost of the boats over a five-year period.

This is part of the Commission's long-term recommendation in replacing the boat fleet on a regular basis, in a cost-effective way, to provide modern boats with much lower maintenance costs.

**Establish fee for snowmobile buoyancy requirement inspection to offset airboat cost.** The Sheriff's Office currently incurs all costs associated with enforcing Dane County Code of Ordinances Section 71.10 through 71.14 which requires inspection of vehicles to determine whether or not they meet buoyancy requirements and to issue a certificate to those vehicles meeting the ordinance requirements. The annual cost to the Sheriff's Office is \$1948.22. The Sheriff's Office proposes to institute a \$10 fee per vehicle to offset the airboat cost, generating annual fee revenue of \$3,750.

### **RECOMMENDED**

**\$7,000 for additional boat operating expenses of the Sheriff's Department due to increased fuel costs.** The Department expects 75% state cost reimbursement, resulting in a net cost to the county of \$1750.

**Increase diving equipment maintenance by \$700 due to increased costs.** Each year the tanks have to be inspected by a certified inspector. The current allocation for maintenance is inadequate to cover the necessary inspection costs.

### **HIGHLY RECOMMENDED – NO ADDITIONAL COST TO COUNTY**

**The footnotes in the Land Conservation classification schedule need to be eliminated.** This is the second year the Commission is recommending this item in our highest overall priority category. Of the 15 existing Land Conservation staff, ten exist contingent on outside funding, and these project positions play key roles in county priority programs. Removing footnotes on the classification schedule for these ten staff members results in a stable workforce to conduct the land and water conservation activities that are high priority. It also makes it possible to use more than \$3 million in annual state and federal funds for soil and water resource protection in Dane County. There is no net cost to the county in removing the footnotes. Federal program money going directly to landowners in Dane County amounts to \$20-25 million annually, and landowner eligibility is contingent on Land Conservation staff approval.

Increase expenditure and create Land Conservation revenue line by \$1,500 for printing and selling the Dane County Erosion Control and Stormwater Management Manual. The manual has been developed by staff and provides needed information to developers and municipalities. It needs to be continually updated and distributed. There is no net cost to the county.

Increase Land Conservation expenditure and revenue line for LTE services, and information, education, and monitoring activities related to the 18 municipalities NR 216 stormwater permit. Each permitted municipality has agreed to contribute toward a half time position housed at Land Conservation. The position will implement I&E activities required by the permit. The county expects to receive a 2-year \$100,000 state grant to assist municipalities in fulfilling plan requirements. There is no net cost to the county.

Increase Land Conservation LTE expenditure line by \$25,000 so service is available to municipalities for 66.30 agreements for erosion control and stormwater management activities. Some smaller municipalities prefer to contract with the county rather than hiring staff of their own. Increasing the expenditure line will enable those who wish to contract with the Land Conservation Department to do so. Middleton, Waunakee, DeForest, Stoughton, and Sun Prairie are currently under contract. In addition, Black Earth and Brooklyn have indicated they would like to enter a 66.30 agreement with the county. The Village of Shorewood Hills has asked Dane County to administer the ordinance. There is no net cost to the county.

**\$50,000 for filling a DNR grant funded LTE staff position to perform lake, stream, and river classifications.** The Planning and Development Department plans to apply for a state Lake Protection and Classification Grant to fund this work, which will assist the county in strengthening its shoreland zoning ordinance to protect high value resources identified during the classification study and public input process. There is a May 2003 deadline to apply for the grant. If the grant is awarded, hiring would occur in fall, 2003.

There is broad support for using a waters classification approach to shoreland zoning ordinance revisions. There is no net cost to the county.

**Public Works Capital Budget Request.** Public Works has submitted a \$600,000 capital request for Tenney Park, Babcock and LaFollette lock repairs. These locks and dams in the Yahara Chain of lakes need major repairs. The Commission supports this request for funding to conduct this work. This is eligible for cost-sharing with the Wisconsin Waterways Commission. There is no additional cost to the county's operating budget.

### **GENERAL RECOMMENDATIONS**

**Regional Plan Commission.** If the RPC is abolished, the Commission recommends the Department of Planning and Development take over all the RPC's water quality functions not assumed by the DNR. According to the County Controller, dissolution of the RPC would have a net negative impact of \$90,000. However, dissolution combined with a merger of RPC staff to the County would have a one-time positive impact of \$243,000.

**Lake Belle View.** An annual County contribution of \$15,000 for the river/lake separation project in the Village of Belleville is included in the county base budget, and as such we have not included it in our decision item recommendations. We do wish to express our ongoing support for this project and the county's ongoing financial support of it.



May 22, 2002

Yahara Lakes Advisory Committee:

At a recent Dane County Public Works Committee meeting there was some discussion about the Yahara Lakes Advisory Committee giving some consideration to the dredging of the Yahara River between Lake Waubesa and Lake Kegonsa. As the County's Park Director I wish to share the Lower Mud Lake Resource Protection Area Plan approved by Dane County in November of 1993. This plan rejects dredging unless it is for wildlife or fish habitat improvement. A further reason to reject dredging is the significant archeological sites located within the river corridor itself. There are fish weirs located in the river north of Dyreson Road; these weirs have been recognized by the Wisconsin State Historical Society. Land adjacent to the river has archeological significance from the earliest period of human inhabitation to later Native American Nations.

I suggest that the Advisory Committee request more information from Bob Birmingham, State Historical Society, the Ho-Chunk Nation and Dane County Parks before making any recommendations for dredging.

Thank you for your consideration.

Sincerely,

Kenneth J. LePine  
Park Director

**LOWER MUD LAKE**

**RESOURCE PROTECTION PROJECT PLAN**

Approved by the Dane County Park Commission

November 10, 1993

Prepared by Staff of the  
Dane County Regional Planning Commission  
and the  
Dane County Park Commission



**LOWER MUD LAKE**  
**RESOURCE PROTECTION PROJECT PLAN**

I. Introduction

Lower Mud Lake was added to the Dane County Parks and Open Space Plan in 1991 as a resource protection area. Residents and local officials from the Town of Dunn and the Village of McFarland suggested making Lower Mud Lake a resource protection project during meetings on the Dane County Greenspace Plan. Lower Mud Lake is a major wetland area along the Yahara River and is, therefore, a significant environmental feature on the main waterway in Dane County. It joins Cherokee Marsh, Sixmile Creek, Pheasant Branch Creek, Lower Waubesa Wetlands, and Door Creek Wetlands as preservation projects along the Yahara drainage system.

The purpose of a resource protection project is to identify the natural resources and historical features which are desirable as permanent open space and institute a preservation program. For Lower Mud Lake this means the long term acquisition of land or land rights from willing sellers as the land becomes available over the years. The plan consists of a project boundary and recommendations for management of land within the project boundary.

II. Objectives

1. Create a preserve along the Yahara River and Lower Mud Lake which has as its primary purpose the preservation and restoration of natural resources.
2. Preserve wetland, floodplain, springs and related features to protect water quality along the Yahara chain of lakes.
3. Provide and protect natural habitat for fish, waterfowl and wildlife.
4. Preserve archeological and historic resource sites.

III. Resources

1. Wetlands

The wetland resources of Lower Mud Lake are significant and have been well documented. The Town of Dunn Open Space Preservation Handbook summarizes the marsh as "...the highest quality shallow wetland in the town...(which) supports a wide variety of migrating birds of prey and nesting and feeding habitat for sandhill

cranes and other wildlife species." Natural functions associated with the wetland include wildlife habitat, water quality, flood control, groundwater discharge and fish spawning areas.

The project area includes three wetlands. The wetland on the east side of Lower Mud Lake is a sedge meadow on a deep layer of peat and encompasses about 200 acres. This wetland extends into the Village of McFarland where it is designated as a park and conservancy area. In two places, arms of this wetland extend eastward to connect with the Door Creek wetlands along Lake Kegonsa. The DNR owns 137 acres on the east side of Mud Lake.

A second wetland area is on the west side of Lower Mud Lake. It is about 400 acres in size. This area is a deep peat deposit and is wetter than the east side wetland. Keenan's Creek flows into the wetland, and there are many springs and seepages discharging groundwater. USH 51 bisects the west wetland. DNR owns approximately 180 acres of land on the west side of Mud Lake. Together the east and west wetlands serve as buffers around Lower Mud Lake and contribute to its value as an isolated wildlife area.

The Tower Road wetland, the third wetland component of the project, is about 100 acres in size. It borders Lake Waubesa. This area is similar in character and size to the west side wetland along Mud Lake. It is primarily an emergent wet meadow with some areas of scrub vegetation on wet soils. A segment of this wetland contains several broadcast towers. The quality of the wetland as a wildlife habitat is considered to be below that of the Mud Lake Wetlands because of the presence of adjacent development and the broadcast towers.

The DNR surveyed the fish populations of Lower Mud Lake several times in the past thirty years. Largemouth bass and northern pike are the dominant predator species, with bluegills and black bullheads the most numerous panfish. Walleyes are present during spawning season. All of the fish species use Lower Mud Lake or the Yahara River for spawning as well as for their major habitat. The primary DNR goal for the Lower Mud Lake wetlands is to maintain high water quality through the natural filtering out of sediments and nutrients and by stabilizing water levels.

## 2. Woodlands

The Town of Dunn Handbook identifies 12 woodlots adjacent to the Lower Mud Lake wetlands. The proximity of the woodlots creates important aesthetic and natural relationships with the wetlands. Three woodlots received a classification of "excellent" in the town survey. Two are on the Herro property on the west side of Lower Mud Lake: one is on an undisturbed island in the marsh; the other is on a hilltop adjacent to the marsh. The third high quality woodland is located on the Dyreson and Everson properties on the east side of Lower Mud Lake. It is rated as having an exceptional variety of plant species.

## 3. Hilltops and Slopes

Only a few points of significant relief or steep slopes border the wetlands in the project area. The wooded hill on the Herro property adjacent to the west side of

Lower Mud Lake has slopes of over 20%. Disturbance of these slopes would create an erosion problem for the wetland as well as impact a high quality woodlot. Another steep, wooded hillside is located on the Gustrowsky, Solheim, and Fischer properties at the southernmost point of the wetlands. The remaining significant slopes are in the 12-20% range and lie along the southern boundary of the wetland west of Mud Lake. One of the hills has been developed for five residential sites on Rivercrest Road, the only significant development along Lower Mud Lake outside of McFarland.

#### 4. Archaeological and Historic Sites

A number of important Indian mound sites are located on hills adjacent to the wetlands. The most notable site is on the larger of the two hills on the Herro property with a total of 11 mounds. The Dane County Archeological Inventory concluded that this site contains the largest mound group remaining in the town and the third largest left in the county. The group is judged to be in excellent condition and well taken care of by the property owners. The inventory also notes that development on the hill would be very difficult because of the number and location of the mounds.

Other mound sites are located on the McClain/DNR properties in the NE NE quarter of Section 15 and the SE SE quarter of Section 10, on the Fitzgerald property on Rivercrest Road, on the Larsen property along the Yahara River, on the Schneider property along Creamery Road, and on the Huff property on Evans Road. A final site is located beneath the broadcast towers in Section 9.

#### 5. Recreational Resources

The Lower Mud Lake Area provides some existing scenic and recreational opportunities. The DNR has public hunting lands along Lower Mud Lake. Recreational boating and fishing occur along the Yahara River and on the lake itself. Babcock County Park provides a campground, boat launch and other facilities. Other boat access sites include Fish Camp Launch, a motorless launch site in McFarland, and a walk-in launch site in the Town of Dunn. The Village of McFarland has several parks and conservancy lands adjacent to the Lower Mud Lake Area.

Any additional recreational use should only be allowed following a detailed plan for such uses with input from local municipalities and landowners.

#### IV. Project Boundary

The proposed project boundary is shown on Map 2. The boundary encompasses approximately 1700 acres, including 1000 acres of lowlands and 700 acres of adjacent uplands. Approximately 434 acres are currently in public ownership by Dane County, Village of McFarland, the Department of Natural Resources, and the Town of Dunn.

### Project Acreage

Lowlands - 1000 acres  
Uplands - 700 acres

Total Project - 1700 acres

Existing Public Ownership - 434 acres

The lowland portion of the project includes the floodplain and wetland areas of the Tower Road Wetlands and Lower Mud Lake Wetlands. Wetland types within the project boundary range from palustrine (wet) soils to submerged marshlands. These lands are not developable under present circumstances, nor should they be in the future. The best uses for the lowlands is preservation for fish and game habitat, floodwater storage, nutrient and sediment filtrations and natural open space.

The 100-year floodplain elevation shown on Map 2 is established by the Federal Emergency Management Agency (F.E.M.A.). The United States Geological Survey assists F.E.M.A. in establishing the 100-year floodplain throughout the United States. This floodplain elevation is established for insurance purposes.

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The upland portion of the project area includes land for several purposes: to maintain a fringe of natural vegetation around the wetlands, to provide a variety of open and woodland habitats for wildlife, to protect historic and archeological resource sites, to maintain the aesthetic character of the area, and to provide for limited recreational access.

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The basic upland boundary is a 300' corridor around the lowlands. The upland corridor is wider than 300' in places to provide for some of the functions listed above. These locations include: 1) the entire Seiferth property up to Bible Camp Road to include a steep wooded slope and connection to Babcock Park; 2) the large hill on the Herro property which contains mound sites, steep slopes, and a high quality woodland; 3) the wooded slope on the Gustrowsky and Solheim properties; 4) the woodland on the Stenjem and Linnerud properties; 5) the slopes on the Fischer and Kramper parcels; 6) the Dyreson property, including the high quality woodlot which extends onto the Everson parcel; and 7) the wooded knoll on the Schneider parcel. The Dyreson property is the most extensive of the upland areas. It contains wetlands, fields, woodlands, and frontage along the Yahara River.

The recommended project boundary is drawn to conform to contours, resources, and physical features of the environment. As acquisition proceeds, it may be necessary to adjust the boundary to accommodate landowner's wishes for rectangular boundary lines, field sizes, or other individual circumstances that may add or subtract to the recommended boundary.

Any residential or otherwise improved parcels which are mapped within the overall project boundary are not recommended for purchase by the county. These properties, or portions of properties, are considered to be excluded from the acquisition plan.

The project boundary does not convey the right of public access on private land within the boundary.

V. Project Management Recommendations

1. Land Management

The purpose of the plan is to maintain or restore the area to as natural a state as possible. This applies particularly to the wetlands, wetland fringes and woodlands. Over time it may be desirable to replant some of the upland buffer area in prairie grasses rather than the existing row crops.

The Dyreson property, if acquired, would present the opportunity for a prairie restoration project on existing agricultural land. The prairie habitat would complement the adjacent woodlands, wetlands and open water features. This parcel would be the most actively managed land in the project.

Management of water resources will continue to focus on improvement of spawning areas in the Yahara River upstream from Lower Mud Lake. Creation of stone and gravel beds will aid the spawning of desirable species. Dredging or altering of Lower Mud Lake for navigational purposes is not recommended. Dredging to improve wildlife and fish habitat in the lake and Yahara River is consistent with this plan.

The Wisconsin Department of Natural Resources and Dane County Parks Department should develop a cooperative agreement for managing lands within the project. The DNR should assume management of wetlands. Under the agreement DNR could integrate any future county owned wetland areas into DNR wetland holdings for the purpose of common administration. The county should likewise manage upland areas and prairie restoration projects.

2. Inventory of Existing Public Access Points

<u>Place</u>	<u>Purpose</u>
Babcock Park	Camping, picnic shelters, boat launch along Lake Waubesa and the Yahara River.
Hidden Farm Road	Limited access (no parking or improvements) to DNR public hunting grounds.
McFarland Parks (several)	Nature trail links to state lands, motorless canoe boarding site on Yahara River.
Fish Camp Launch	Boat launch at mouth of Yahara River on Lake Kegonsa.

All existing and any future public access points should be carefully controlled, including signage, supervision and enforcement, to protect natural features and protect the rights and privacy of adjacent private property owners. Local municipalities, agencies and citizens should be consulted on the location and type of any access improvements.

3. Potential Public Lands

If parcels are acquired in fee, then public use should be considered subject to a planning process involving local municipalities and citizens.

4. Boating on Lower Mud Lake

Motorboating on Lower Mud Lake should be controlled to prevent disturbance of waterfowl and to reduce erosion caused by motorboat wakes. Wave action erodes cattail clumps and causes sediments to be released into the water. A "no wake" zone should be established by ordinances enacted by the Town of Dunn, the Village of McFarland, and Dane County and properly enforced by DNR and Dane County Sheriff's Department personnel.

It is recommended that the use of gas powered boats, personal watercraft (jet skis) or aircraft be restricted from the waters of Lower Mud Lake.

Development of new boating access sites is strongly discouraged and is not recommended as part of this plan.

5. Hunting on Public Land

No hunting shall be allowed on lands within the project boundary which are acquired by Dane County. The Department of Natural Resources should restrict hunting on state lands within the project boundary to bow hunting, with the exception that shotguns may be used for waterfowl hunting. Public hunting areas should be clearly posted.

VI. Acquisition Recommendations

The goal of the county is to acquire the minimum necessary interest in property on Lower Mud Lake to achieve resource preservation and accommodate the needs of landowners.

Preservation easements conveyed to either public or private agencies are preferred throughout most of the project area. Preservation easements provide a range of options to preserve land while maintaining private ownership and use. Under a preservation easement the land is deed restricted in return for compensation. This allows for preservation, while also allowing owners to recoup equity for ownership rights which are relinquished.

Private efforts at preservation through the sale or donation of easements to private organizations are valid ways of implementing the goals of the plan. These actions are encouraged. In other cases the availability of public funds may provide sufficient incentive to spur preservation efforts.

Fee simple acquisition may be necessary for some lands within the project, and recommended for other lands when it is the only available option.

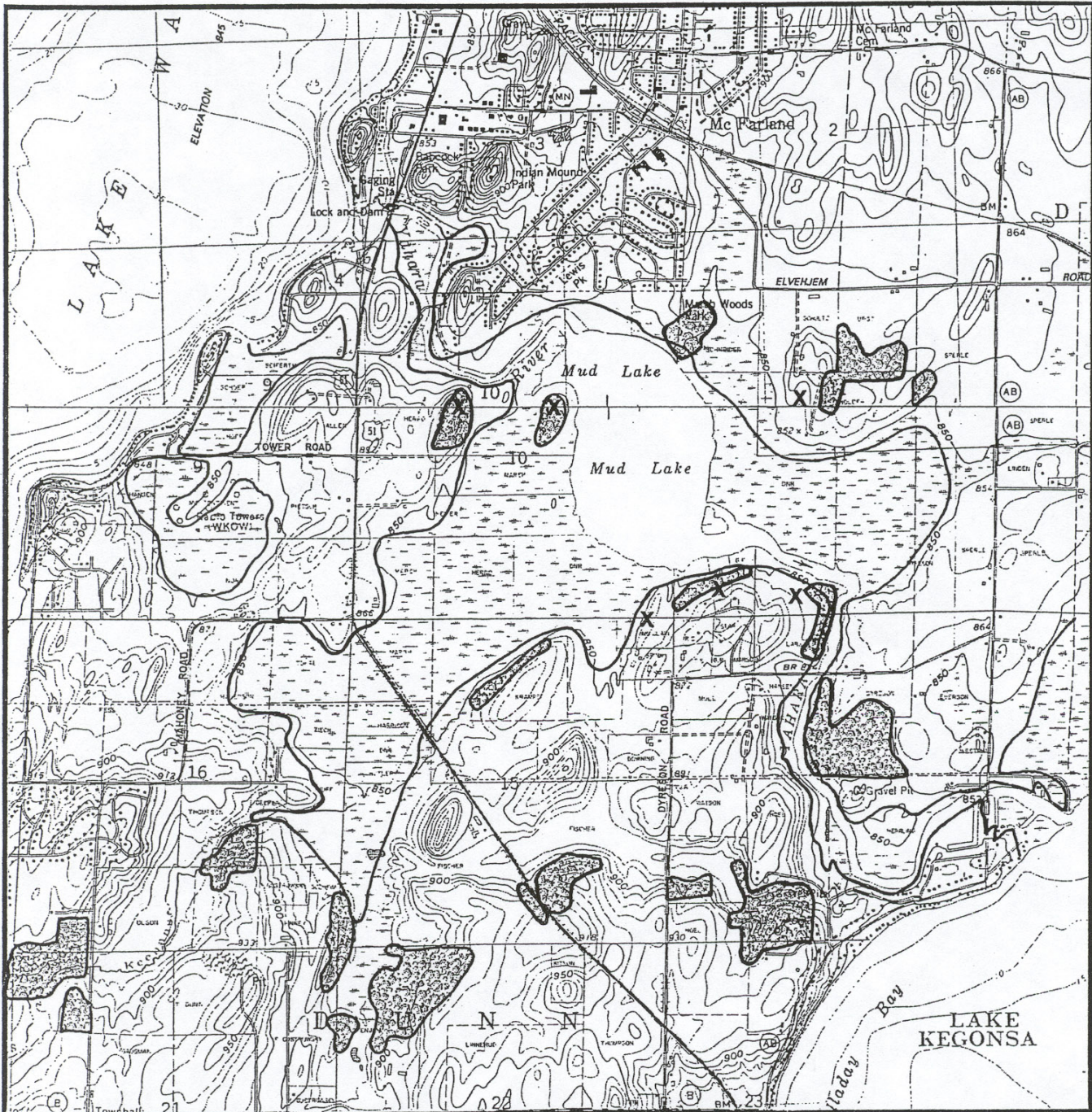
All public acquisitions, whether fee simple or easements, follow established state laws and guidelines to assure compensation is at fair market value.

## VII. Relationship of Lower Mud Lake Plan to Land Use Plans and Land Use Recommendations

This project plan is not a land use plan or zoning ordinance and does not override or replace existing regulations. This plan offers the options of land acquisitions and preservation easements at fair market value as a means of implementing preservation of the Lower Mud Lake area.

1. This project plan has been designed to be compatible with adopted Dane County, Village of McFarland and Town of Dunn Land Use Plans and development guidelines, so that future county acquisitions aid in achieving adopted plan goals. Specifically:
  - a. The lowland, woodland and slope components of the project plan generally correspond to the designated open space system in the Town of Dunn Land Use Plan.
  - b. The designated open space system portion of the Town of Dunn Land Use Plan has been adopted by the county and the Dane County Regional Planning Commission as part of the Regional Development Guide's open space corridor.
  - c. The Village of McFarland Master Plan directs future urban development eastward from present village boundaries, and designates the general project area as park and conservancy lands.
  - d. The Village of McFarland is developing a stormwater management system to eliminate direct runoff into Lower Mud Lake.
2. Prior to considering rezoning for development within the project boundary, the county should refer the zoning petition to the County Park Commission for a response.

# DANE COUNTY WISCONSIN

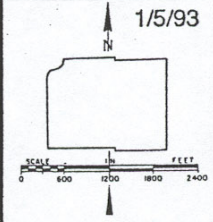


## LOWER MUD LAKE: Resources

Map 1

- |   |            |   |             |
|---|------------|---|-------------|
|  | Woodlands  |  | Wetlands    |
|  | Floodplain | X   | Mound Sites |

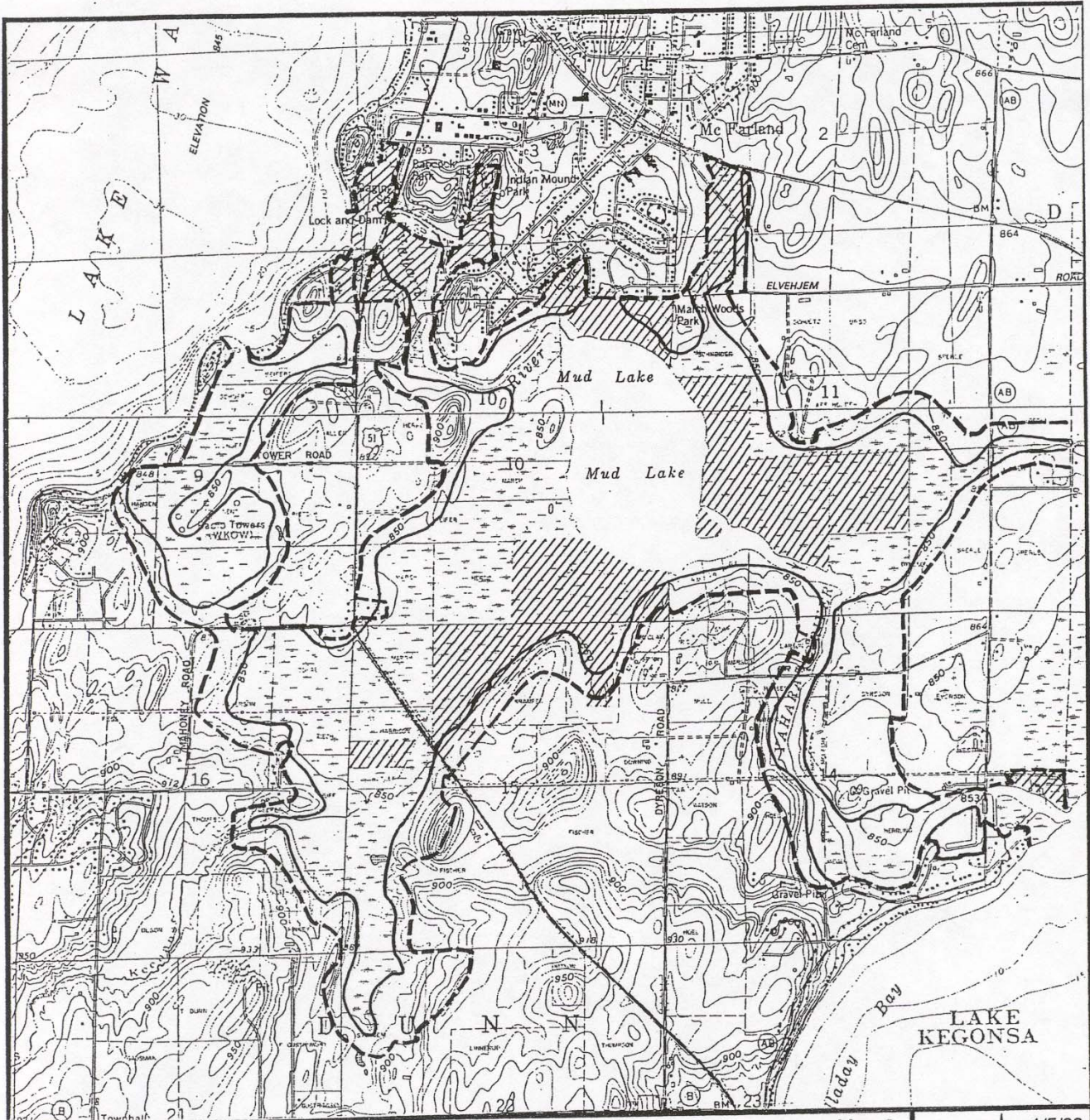
NOTE: Contour slope interval=10'



Prepared by: THE DANE COUNTY  
REGIONAL PLANNING COMMISSION



# DANE COUNTY WISCONSIN

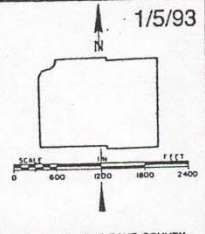


## LOWER MUD LAKE: Proposed Project Boundary

- Proposed Project Boundary
- Floodplain/Wetland Boundary
- //// Existing Public Ownership

Map 2

1/5/93



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REGIONAL PLANNING COMMISSION

# DANE COUNTY WISCONSIN



LOWER MUD LAKE: Preliminary Concept Plan

Map 3

- Project Boundary
- \* Access Points

11/10/93

SCALE  
0 600 1200 1800 2400 FEET

Prepared by: THE DANE COUNTY  
REGIONAL PLANNING COMMISSION

# ICE EXPANSION

**KEN KOSCIK<sup>1</sup> Member, ASCE**

## **Abstract**

Ice expansion on our inland lakes in Wisconsin causes structural damage to buildings and retaining walls. Expansion also causes large pressure ridges in various parts of lakes which are a safety concern for snowmobiles, ice boaters, and fishermen. Ice expansion has bulldozed and destroyed expensive shoreline property.

This paper explores the physical phenomena of ice expansion on our inland lakes in Dane County, Wisconsin. Madison is the County Seat of Dane County. The paper explores methods of determining ice expansion. Alternative management strategies to prevent expansion are also discussed

## **Introduction**

There are four lakes in the Madison metropolitan area and all are connected by the Yahara River. Lake Kegonsa is 4.8 km (three miles) in diameter, Waubesa is 1.6 km (one mile) wide and 4.8 km (three miles) long, Monona is 2.8 km (one and three-quarters mile) wide and 5.6 km (three and one-half miles) long, and Mendota is irregular in shape but is nominally 8.8 km (five and one-half miles) in width.

As Director of Public Works, a small but important part of my job is to control lake levels. The Department of Natural Resources has issued orders that specify the levels for different times of the year. Typically, the lakes need to be drawn down 0.3 m (one foot) in order to provide storage for spring runoff. The drainage area above Lake Mendota is about 777 km<sup>2</sup> (300 sq. miles). The drainage area is primarily farmland, but has experienced significant spring runoff.

Another reason for lowering the lakes is to prevent ice damage to the shoreline. The ice damage comes from the ice expansion along the shoreline and from wind driven ice. Drawing the lakes down 0.3 m (one foot) provides the appropriate beachfront.

In the winter, most casual observers of our lakes are surprised by the occasional loud boom. It almost sounds like a sonic boom. If you have ever spent time ice fishing, you have probably heard the ice booming. I have never experienced a large pressure crack forming, but I have observed many of them and crossed them when ice fishing. The largest pressure cracks occur on Lake Mendota.

Ice can cause significant damage along a shoreline. The ice acts like a large bulldozer pushing up trees and armor protection along the immediate shoreline. Occasionally large areas of lawn, 6 m to 9 m (20 to 30 feet) in from the shoreline, erupt and push up. See Figure 1.

Lawn pushups can vary in length from a few feet to 15 meters (50 feet). The lawn or shoreline will push up for a length of 15 meters (50 feet), then skip 30 meters (100 feet), push up 7.5 meters (25 feet), skip 15 meters (50 feet) and continue down the shoreline at random. There is no apparent reason for this random ice damage—and there is no regular pattern.

When we are unable to lower the lakes sufficiently, damage along the shoreline is sure to occur.

After receiving many calls over several years, I decided to look at the physics of this ice shove phenomena.

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<sup>1</sup>Director, Dane County Public Works Department, 1919 Alliant Energy Center Way, Madison, Wisconsin 53713.

What I found surprised me. It also helped explain what happens on the lake each winter.

Here is a little more technical look at what happens to ice. Ice has a thermal coefficient of expansion of  $.000051 \text{ m/m/C}^\circ$  for each change in degree from  $0$  to  $-20^\circ\text{C}$ . If the air temperature is  $-40^\circ\text{C}$  and the ice-water contact is  $0^\circ\text{C}$ , then the average ice temperature is  $-20^\circ$ .

Air	$-40^\circ\text{C}$
Ice	Average Temp. $-20^\circ\text{C}$
Water	$0^\circ$

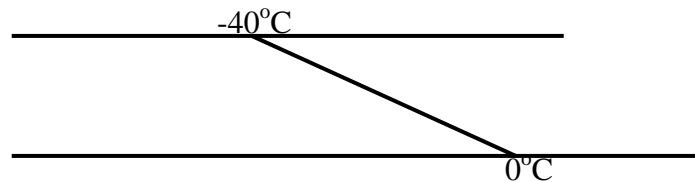
When the air temperature goes up to  $0^\circ\text{C}$  or above, then we have the average temperature of the ice at  $0^\circ\text{C}$ . The average temperature of the ice just increased  $20^\circ$ .

Air	$0^\circ\text{C}$
Ice	$0^\circ\text{C}$
Water	$0^\circ\text{C}$

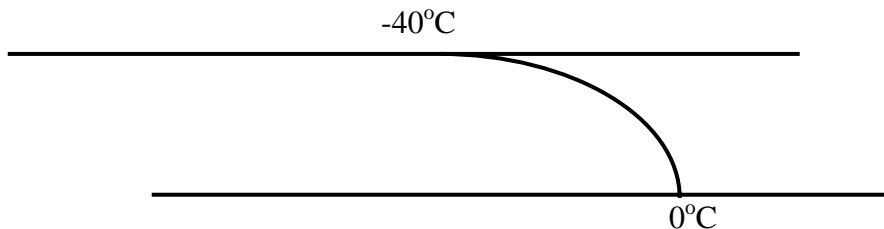
If the sheet of ice was a perfect circle 8 km (five miles) in diameter and had room to expand, the ice sheet would expand 8.2 m (27 feet):  $20^\circ \times .000051 \times 8000 \text{ m} = 8.2 \text{ m}$ .

Lake Mendota is not a perfect circle but is over 8 km (five miles) in length and width. There is little room for expansion of 8.2 meters (27 feet). Therefore, a large pressure buildup occurs. When it finally lets go, ice pressure ridges form in the lake, major ice pushes along the shoreline, and we hear the ice booming. It can be very dramatic when we get these large temperature swings.

The example above assumes a straight-line temperature variation through the ice.



Others would argue that the temperature would follow a different line through the ice.



The amount of ice expansion depends on many variables. Has it been  $-40^\circ\text{C}$  for several days or just one day? Did the air temperature warm up gradually over several days or did it happen in one day?

Regardless of the variables, the important point to remember is that ice expansion on large lakes can be significant. Expansion may cause significant structural damage to sea walls, trees and aesthetic damage to lawns. It all costs money to repair. Repair costs can be high--\$1,000 to \$5,000 per property.

A little more research revealed that the compressive strength of ice is 14,600 kg per square meter (3000 pounds per square foot). It is not uncommon for the ice on our Madison lakes to be 0.5 m to 0.6 m (20 to 24 inches) thick. At 14,600 kg per square meter (3000 psf), 0.6 m (24 inches) of ice could push 9000 kg per lineal meter (6000 lbs. Per lineal foot).

These conditions can easily cause shoreline damage or result in large pressure ridges. Dane County's strategy to minimize damage has been to lower the lakes each fall and leave a little beach for the ice to ride up on. It normally takes 30 to 45 days to lower all of the lakes 0.3 m (one foot).

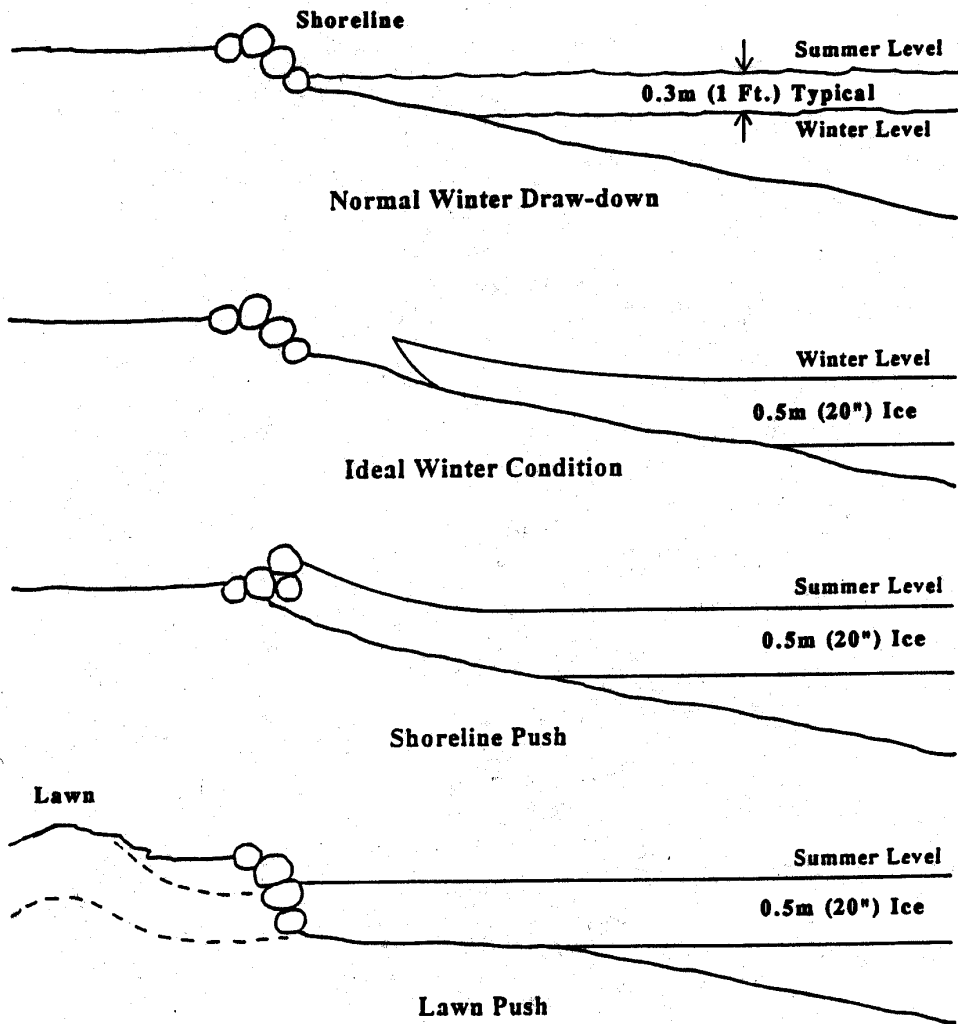
### Alternative Strategies

In one case on Lake Kegonsa, an old shoreline supper club was experiencing structural damage to the building. A unique approach was used to solve the problem. The ice was cut with chain saws about 15 m (50 feet) from the shoreline and a section of ice 0.6 m (two feet) wide was actually removed to relieve the expansion pressure. In another case, an air bubbler system was installed. This prevented ice from forming in front of the structure. At another structure, a small submersible water pump was installed to keep the water moving 24 hours a day all winter long. The pump was only one-third horsepower, but kept the water open in front of a 6 m (20 foot) tainter gate. In all of these cases, open water on the lake was properly barricaded to prevent accidents.

### Conclusions

Changes in air temperature have a dramatic impact on ice-covered lakes. Lakes 8 km (five miles) in length can experience ice expansion of 8 m (27 feet) in a typical winter. Damage from ice expansion can be reduced by lowering the lakes 0.3 m (one foot). This typically provides some open beach for ice expansion.

Damage from ice can be prevented by using air bubbler or water pump systems. The circulation prevents the ice from forming and keeps ice away from the shoreline or structure that needs to be protected.



**Figure 1.**